

Algebra 1
2.5 part 1 Compound Inequalities

Compound Inequalities - when two inequalities are considered together.

ex) $x \geq 4$ and $x < 8$

Includes $\{4, 5, 6, 7\}$

another way
to write an
"and" statement

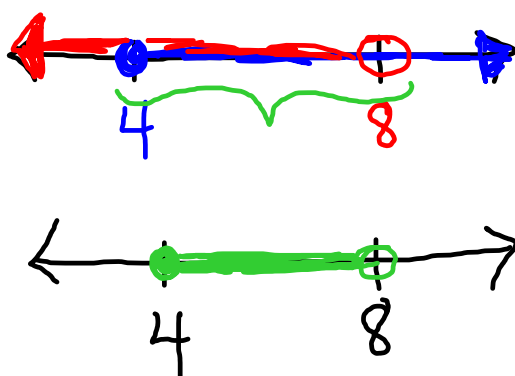
$4 \leq x < 8$

ex) $x > 3$ or $x \leq 1$

Includes $\{-\infty, \dots, -2, -1, 0, 1, 4, 5, 6, \dots, \infty\}$

A compound inequality containing **and** is true only if both inequalities are true. Thus the graph is the **intersection** of the graphs of the two inequalities.

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Solve & Graph an Intersection

$$-5 < x - 4 \quad -5 < x - 4 < 2 \quad x - 4 < 2$$

$$-1 < x < 6$$

Now Graph

Solve & Graph an Intersection

$$1) -8 < 2x - 4 \leq 2$$

$$\frac{-4}{2} < \frac{2x}{2} \leq \frac{6}{2}$$

$$-2 < x \leq 3$$

$$2) 5 \leq -4 - 3x < 11$$

$$\frac{9}{-3} \leq \frac{-3x}{-3} < \frac{15}{-3}$$

$$-3 \geq x > -5$$

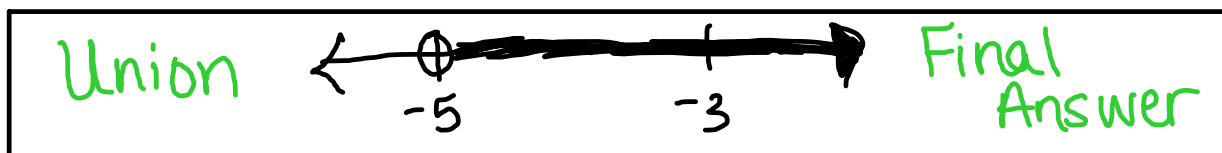
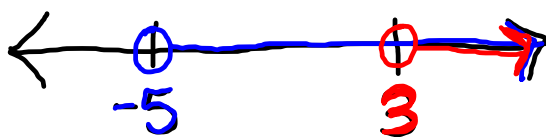
$$\text{OR}$$

$$-5 < x \leq -3$$

Solve & Graph a Union
Solve each inequality

$$-3h + 4 < 19 \quad \text{or} \quad 7h - 3 > 18$$

$$\begin{array}{rcl} -4 & -4 & +3 \quad +3 \\ \frac{-3h}{-3} < \frac{15}{-3} & & \frac{7h}{7} > \frac{21}{7} \\ h > -5 & \text{or} & h > 3 \end{array}$$



Solve & Graph a Union

$$1) \quad -2x - 5 \geq -2 \quad \text{OR} \quad x - 3 > 2$$

$$\text{flip} \rightarrow \frac{-2x}{-2} \geq \frac{3}{-2}$$

$$x > 5$$

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

or



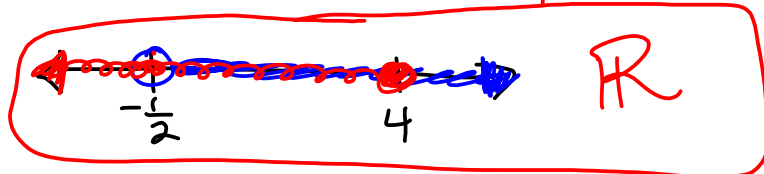
$$2) \quad 6 - 2x < 7 \quad \text{OR} \quad -8 + 3x \leq 4$$

$$\text{flip} \rightarrow \frac{-2x}{-2} < \frac{1}{-2}$$

$$x > -\frac{1}{2}$$

$$\frac{3x}{3} \leq \frac{12}{3}$$

$$x \leq 4$$



Try this: Solve & Graph

$$4k - 7 \leq 25 \quad \text{OR} \quad 12 - 9k \geq 30$$

$$\frac{4k}{4} \leq \frac{32}{4}$$

$$\text{flip} \rightarrow \frac{-9k}{-9} \geq \frac{18}{-9}$$

$$k \leq 8 \quad \text{OR} \quad k \leq -2$$

What would a no solution or all real numbers problem look like?

$$1) \quad 5x - 12 < 8 \quad \text{OR} \quad -2x + 1 \leq -5$$

$$\frac{5x}{5} < \frac{20}{5} \quad \text{flip} \quad \frac{-2x}{-2} \leq \frac{-6}{-2}$$

$$x < 4 \quad \text{OR} \quad x \geq 3$$



$$2) \quad 8 \leq x - 3 \quad \text{AND} \quad x - 3 < 4$$

$$11 \leq x$$

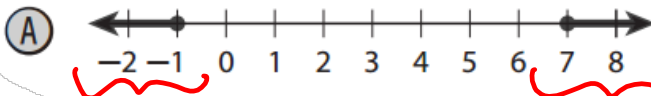
$$x < 7$$

$$x \geq 11$$

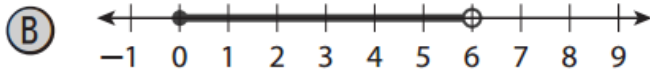
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Write the compound inequality shown by each graph.



$$x \leq -1 \quad \text{or} \quad x \geq 7$$



$$0 \leq x < 6$$

Write a compound inequality to represent the indicated quality-control level, and graph the solutions.

- (A) The recommended pH level for swimming pool water is between 7.2 and 7.6, inclusive. $\leq \geq$
- Let p be the pH level of swimming pool water.

$$7.2 \leq p \leq 7.6$$



- (B) The recommended free chlorine level for swimming pool water is between 1.0 and 3.0 parts per million, inclusive. $\geq \leq$

Let c be the free chlorine level in the pool.

$$1.0 \leq c \leq 3.0$$



Homework:

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