Algebra 1 5.4

Solve compound inequalities (and/or)

Graph solution sets of compound inequalities

52 72

inequality

greater than

less than

Venn diagram

intersection T for Both

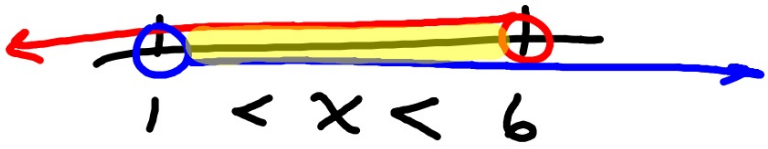
union T at least one

compound inequality

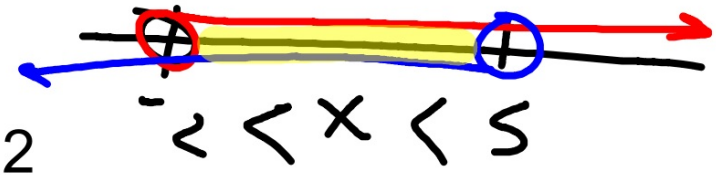
- To ride certain roller coasters, you must be at least 52 inches tall, and your height cannot exceed 72 inches. If h represents the height of a rider, we can write two inequalities to represent this.

Graphing practice

$x<6$ AND $x>1$



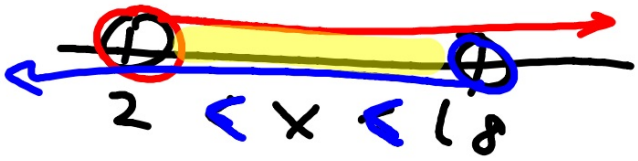
$x>-2$ AND $x<5$



$x+1>3$ AND $x-6<12$

$-1\ -1$ $\quad$ $+6\ +6$

$x>2$ $\quad$ $x<18$



AND

$x>3$ and $x<9$

$x\geq -6$ and $x\leq -2$

1 Inequalities Containing *and* When considered together, two inequalities such as $h \geq 52$ and $h \leq 72$ form a **compound inequality**. A compound inequality containing *and* is only true if both inequalities are true. Its graph is where the graphs of the two inequalities overlap. This is called the **intersection** of the two graphs.

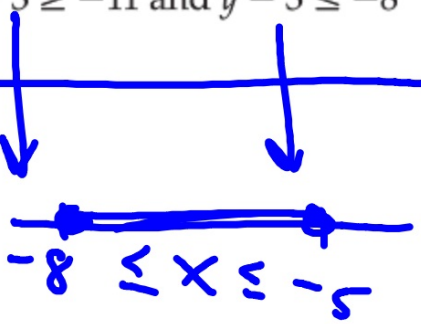
BOTH are True!

AND: Where is it true for both? (intersection= overlap)

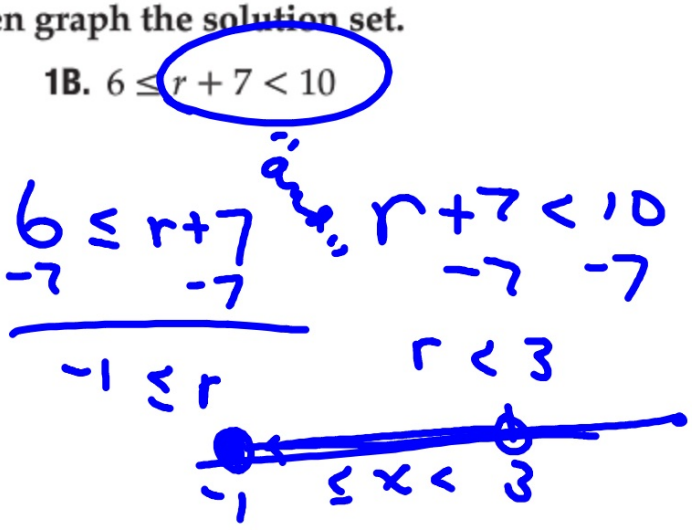
GuidedPractice

Solve each compound inequality. Then graph the solution set.

1A. $y - 3 \geq -11$ and $y - 3 \leq -8$



1B. $6 \leq r + 7 < 10$



You need to know the code...

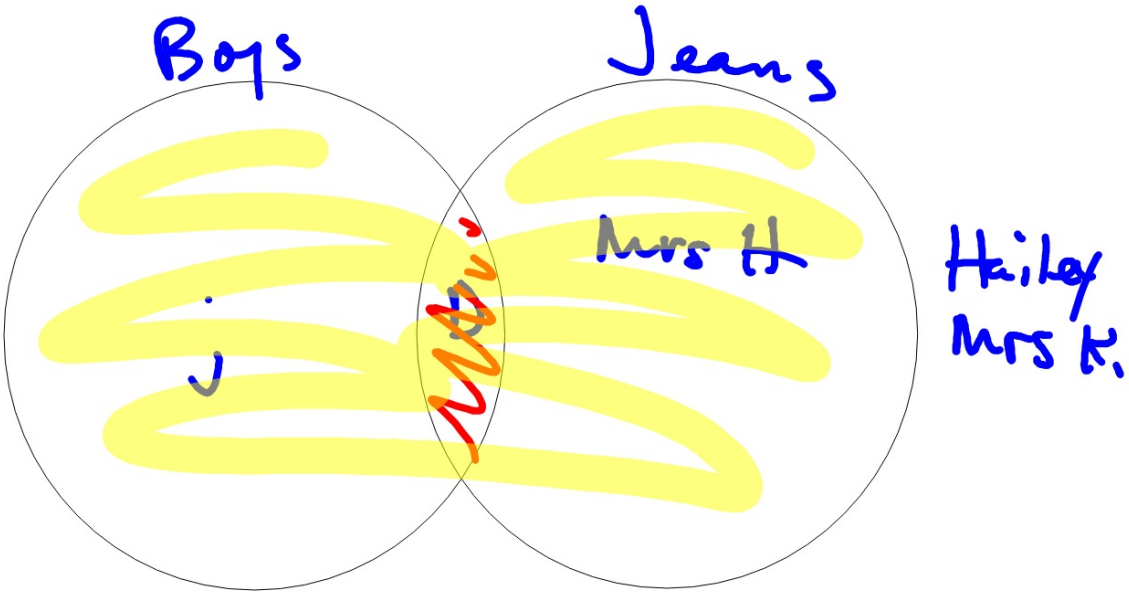
Example 1 Solve and Graph an Intersection

Solve $-2 \leq x - 3 < 4$. Then graph the solution set.

Write 2 separate inequalities...

Union

boys
wearing jeans



AT LEAST one is true

2 Inequalities Containing *or* Another type of compound inequality contains the word *or*. A compound inequality containing *or* is true if at least one of the inequalities is true. Its graph is the **union** of the graphs of two inequalities.

OR: at least one of them is true (union...anything shaded by either)

Example 3 Solve and Graph a Union

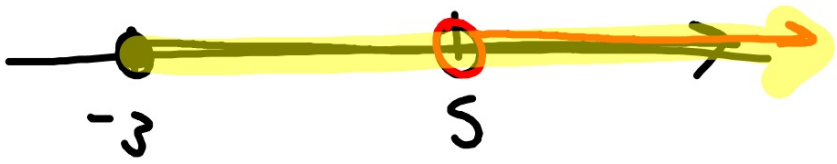
Solve $-2m + 7 \leq 13$ or $5m + 12 > 37$. Then graph the solution set.

$-7 \quad -7$ $\qquad$ $-12 \quad -12$

$\frac{-2m}{-2} \leq \frac{6}{-2}$ $\qquad$ $\frac{5m}{5} > \frac{25}{5}$

$m \geq -3$ $\qquad$ $m > 5$

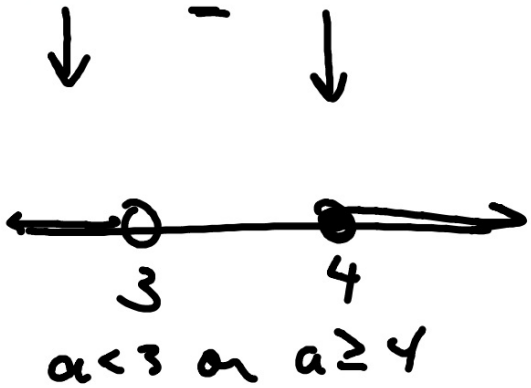
$x \geq -3$



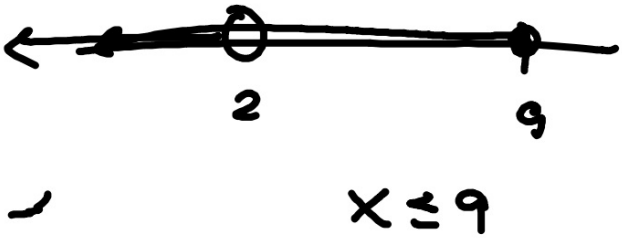
Whiteboards

Solve each compound inequality. Then graph the solution set.

3A. $a + 1 < 4$ or $a - 1 \geq 3$



3B. $x \leq 9$ or $2 + 4x < 10$



StudyTip

Intersections and Unions
The graphs of compound inequalities containing *and* will be an intersection. The graphs of compound inequalities containing *or* will be a union.

Real-World Example 2 Write and Graph a Compound Inequality

SOUND The human ear can only detect sounds between the frequencies 20 Hertz and 20,000 Hertz. Write and graph a compound inequality that describes the frequency of sounds humans cannot hear.