Algebra 1 5.4

Solve compound inequalities (and/or)

Graph solution sets of compound inequalities

$h \geq 52$

$h \leq 72$

inequality $< \; > \; \leq \; \geq$

greater than

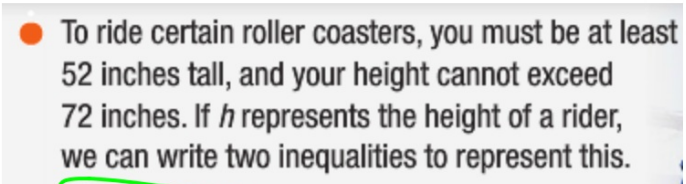
less than

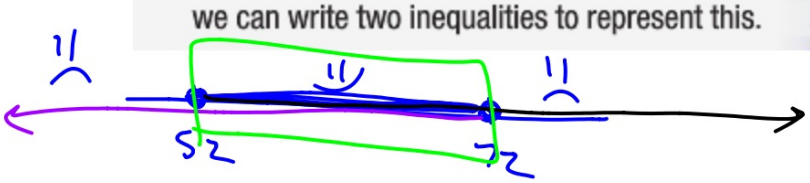
Venn diagram

intersection

union

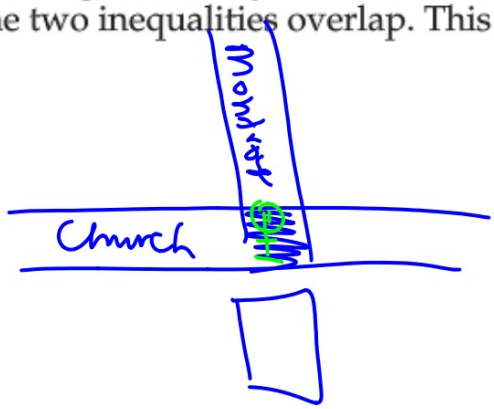
compound inequality





activ: paper strips

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 things T

BOTH are True!

Intersection

girls

people wearing jeans

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

1. Solve
2. Solve

GuidedPractice

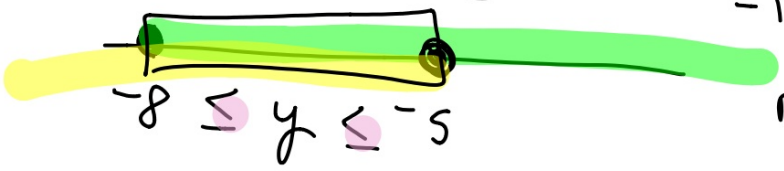
Solve each compound inequality. Then graph the solution set.

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

+3 +3 +3 +3

$y \geq -8$ and $y \leq -5$

$-8 \leq y \leq -5$



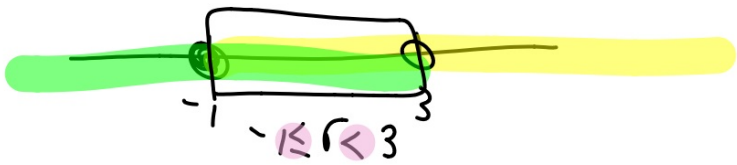
1B. $6 \leq r + 7 < 10$

$6 \leq r + 7$ and $r + 7 < 10$

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

$-1 \leq r \qquad r < 3$

$r \geq -1$



$-1 \leq r < 3$

$\frac{2x}{2} \leq \frac{56}{2}$ and $\frac{3x}{3} > \frac{27}{3}$

$x \leq 28$ $\quad x > 9$

$9 < x \leq 28$

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...

$-2 \leq x - 3$

$+3 \quad +3$

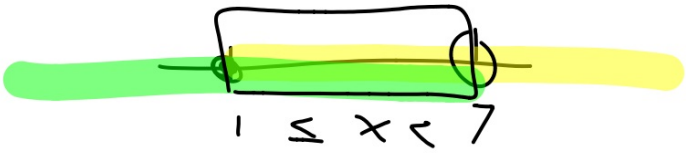
$1 \leq x$

$x \geq 1$

$x - 3 < 4$

$+3 \quad +3$

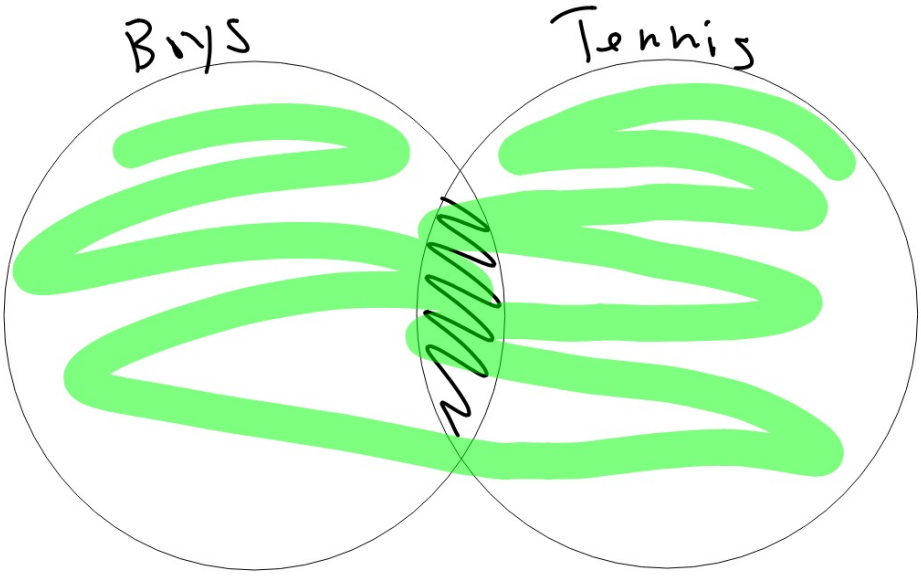
$x < 7$



Union
boys
people wearing tennis shoes

or union

T at least one



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)

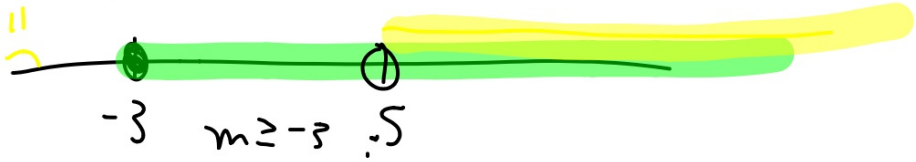
Example 3 Solve and Graph a Union

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

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

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

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



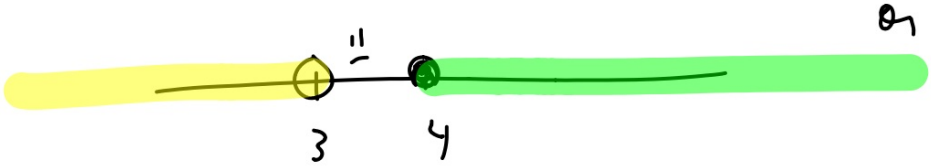
Whiteboards

Solve each compound inequality. Then graph the solution set.

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

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

$a < 3$ or $a \geq 4$



$a < 3$ or $x \geq 4$

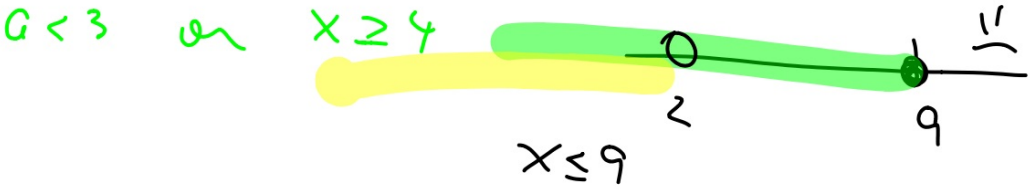
3B. $x \leq 9$ or $2 + 4x < 10$

$x \leq 9$

$-2 \quad -2$

$\frac{4x}{4} < \frac{8}{4}$

or $x < 2$



$x \leq 9$

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.