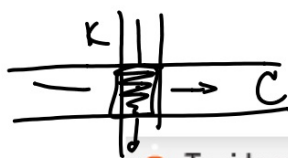


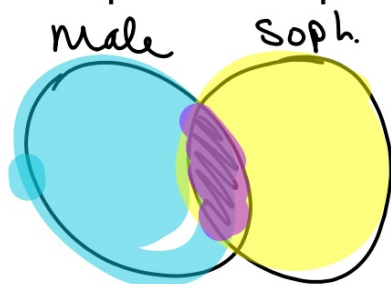
Algebra 1 5.4
Solve compound inequalities (and/or)
Graph solution sets of compound
inequalities



inequality
greater than $>$ $\geq$
less than $<$ $\leq$

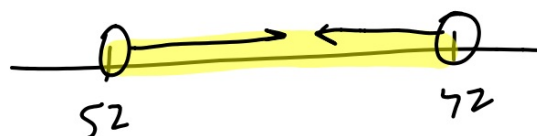


Venn diagram
intersection both
union all
compound inequality



- 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.

$$h \geq 52 \text{ and } h \leq 72$$



True for both

What (whole) numbers would work?

$$\underline{x < 6} \text{ AND } \underline{x > 1}$$

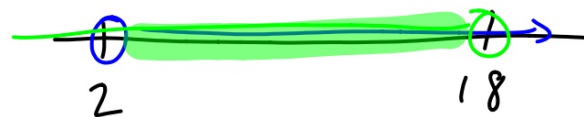
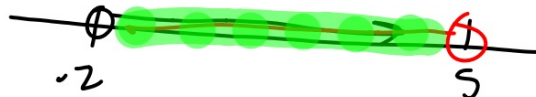
5 4 3 2

$$x > -2 \text{ AND } x < 5$$



$$\begin{array}{rcl} x+1 > 3 & \text{AND} & x-6 < 12 \\ \underline{-1 \quad -1} & & \underline{+6 \quad +6} \\ x > 2 & & x < 18 \end{array}$$

-1 0 1 2 3 4



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.

2 parts both T

BOTH are True!

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

Guided Practice

Solve each compound inequality. Then graph the solution set.

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

$+3$ $+3$ $+3$ $+3$

1. $y \geq -8$

2. $y \leq -5$

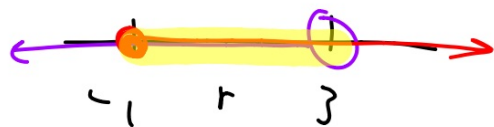
3. both T and

$-8 \leq y \leq -5$

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

$$\begin{array}{r} 6 \leq r + 7 \\ -7 \quad -7 \\ \hline -1 \leq r \end{array}$$

$$\begin{array}{r} r + 7 < 10 \\ -7 \quad -7 \\ \hline r < 3 \end{array}$$



$-1 \leq r < 3$

and intersection

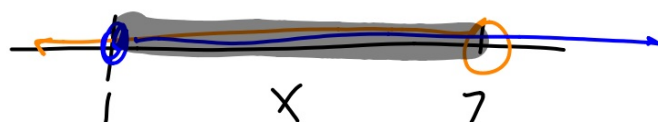
You need to know the code...

Example 1 Solve and Graph an Intersection

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

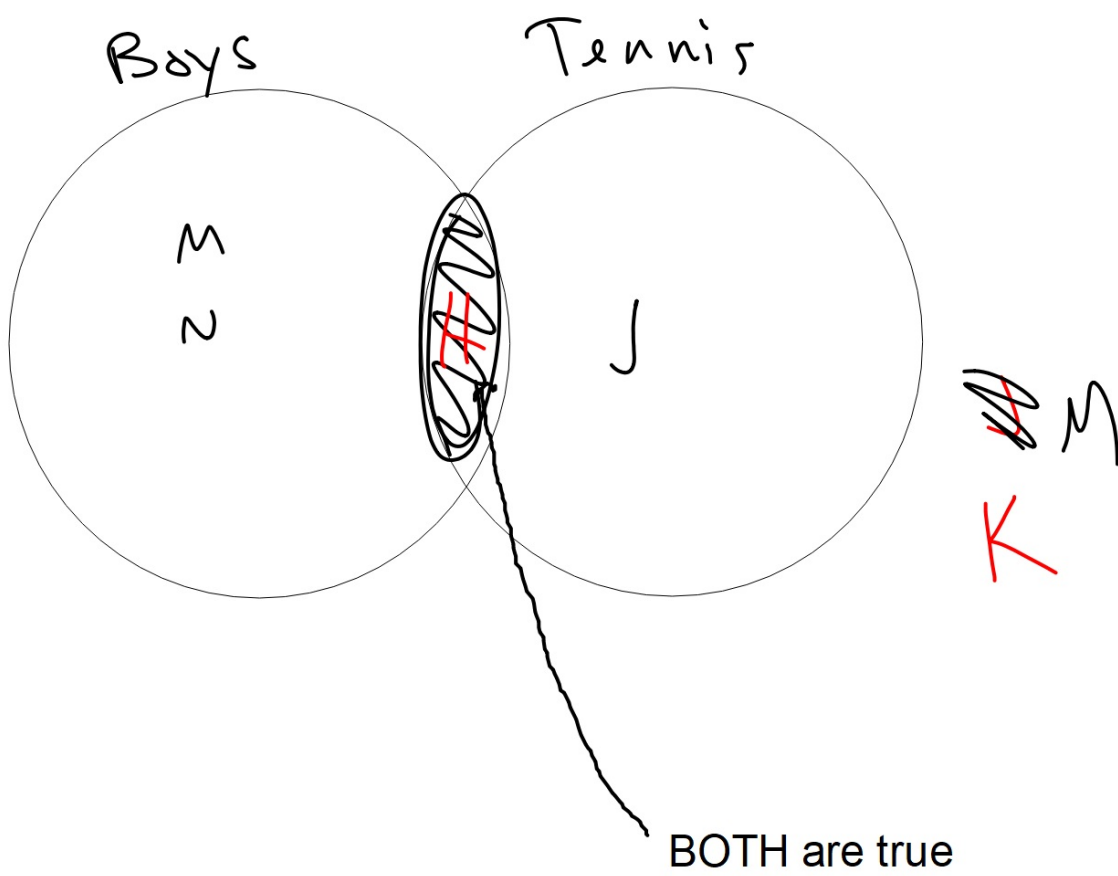
$$\begin{array}{rcl} -2 \leq x + 3 & \text{and} & x + 3 < 4 \\ +3 & & +3 \\ \hline 1 \leq x & & x < 7 \end{array}$$

Write 2 separate inequalities...

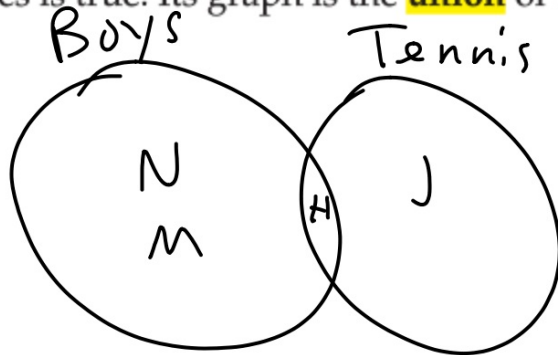


$$1 \leq x < 7$$

Intersection:
boys
wearing tennis shoes



OR
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.



M
K

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.

↑
skip

S.4 Skills

2	3	5	6	9	11
13	15				

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.