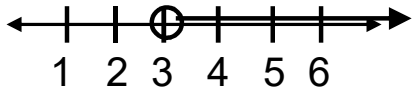
Math-2A
Lesson 1-6

Solve Compound Linear Inequalities

Simple Inequality: has one letter (variable) and one inequality symbol

$x > 3$

All numbers that are greater (bigger) than 3



Compound Inequality: the result of combining two simple inequalities with the logical words "and" or "OR".

$x \leq -3$ or $x > 2$

$x > 5$ and $x > 7$

If you are wearing a red shirt OR if you are wearing blue jeans, you will be awarded $100. Which of the girls below will get $100?.

Who gets $100?

Logical Word "OR:" two or more required conditions are given. If either of the conditions is met then the statement is true.

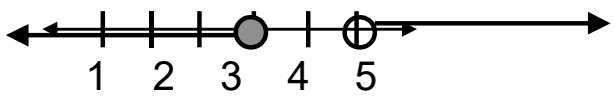
"OR" type compound inequalities.

$x \le 3$ or $x > 5$

Is -2 a solution to the compound inequality?

Or means: the numbers that satisfy either condition

Which part is $x \le 3$? Which part is $x > 5$?



Hint: inequality with "OR" looks like: ← →

Solve and graph the compound inequality:

Solve each simple inequality separately.

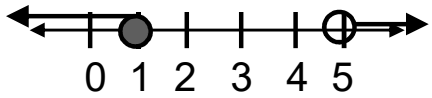
$2x + 3 \le 5$ or $x - 3 > 2$

$-3 \quad -3 \qquad +3 \quad +3$

$2x \le 2$ or $x > 5$

$\div 2 \quad \div 2$

Solution: $x \le 1$ or $x > 5$



If you are under the age of 15 AND are walking a dog, then you are pretty cool.

Which picture shows a person(s) who is(are) "pretty cool?"

Logical Word "AND:" two or more required conditions are given. If BOTH of the conditions are met then the statement is true.

"AND" type compound inequalities.

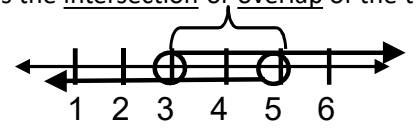
$x > 3$ and $x < 5$

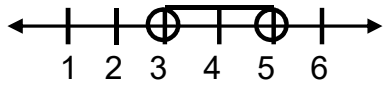
Is -2 a solution to the compound inequality?

And means both conditions must be met

What part is $x > 3$? What part is $x < 5$?

What is the intersection or overlap of the two?

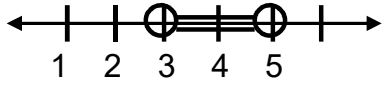




Compound inequality $x > 3$ and $x < 5$

Hint: This can also be written as: $3 < x < 5$

Hint: Inequality with "and" looks like: → ←



Verbal Inequalities

The cost of a car is at most \$20,000. $0 \le c \le \$20{,}000$

It takes Joe no less than 5 minutes to run a mile.

$t \ge 5$ min

It takes between 3 and 8 months to build a house.

3 months $< t <$ 8 months

The cost of a loaf of bread is less than \$2

$0 \le c \le \$2$

You can't buy a car for less than \$8000.

$c \ge \$8000$

Your turn: (a) Write in inequality notation
(b) Graph the inequality

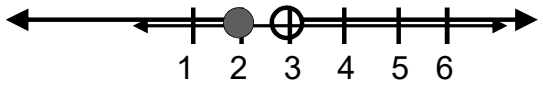
There are least 65,000 spectators at the game.

It never gets above 100 degrees in Huntsville.

You can fit, at most, 5 cars in your garage.

Three Ways to show an Inequality

1. Inequality: $x > 3$ $x \le 2$
2. "Interval Notation: $(3, \infty)$ $(-\infty, 2]$
3. Number line:



Compound inequalities (two inequality symbols)

KEY POINT: This is an AND inequality. Break it into two simple inequalities separated by "AND".

$5 \le x + 1 < 9$

$5 \le x + 1$ and $x + 1 < 9$

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

Solution: $4 \le x$ and $x < 8$

Same as: $4 \le x < 8$

Your turn: Solve the inequality

$-3 < 4 - x \le 3$

$-5 < x + 1$ and $x + 1 \le 6$

$4x - 7 \le 5$ or $3x + 2 > 23$

Sometimes there is no solution

Solution: the value(s) of the variable that make the statement true.

$2(x - 4) > 2x + 1$

$2x - 8 > 2x + 1$

$-2x \quad -2x$

$-8 > 1$

No solution: when the variable dissappears and the resulting statement is false.

Sometimes the solution is "*all real numbers*".

Solution: the value(s) of the variable that make the statement true.

$4x - 5 \le 4(x + 2)$

$4x - 5 \le 4x + 8$

$-4x \quad -4x$

$-5 \le 8$

Infinitely many solutions: when the variable dissappears and the resulting statement is true.