Algebra 1: 2.6 Solving Absolute Value Inequalities

Warmup: What range of numbers would work for x here?

$|x| < 3$

Some Examples ...

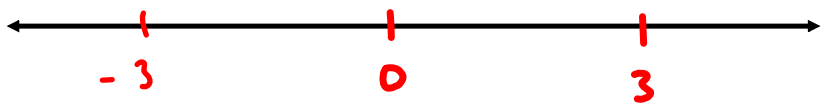
$|-2| < 3$ $|-1| < 3$

$|2| < 3$ $|1| < 3$

$|-2.9| < 3$ $|2.9| < 3$

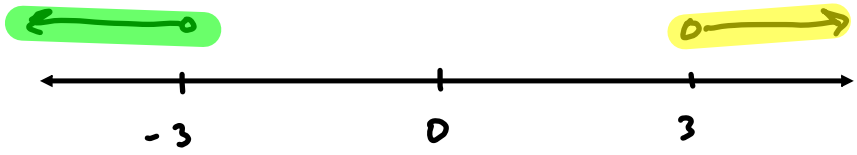
$x > -3$ and $x < 3$

$-3 < x < 3$



↑ All those Examples are true.

What about... $|x| > 3$?



numbers bigger than 3 work...

but also numbers smaller than -3 work too!

$|-4| > 3$ True!

So you could say this is the Answer

$x > 3$ or $x < -3$

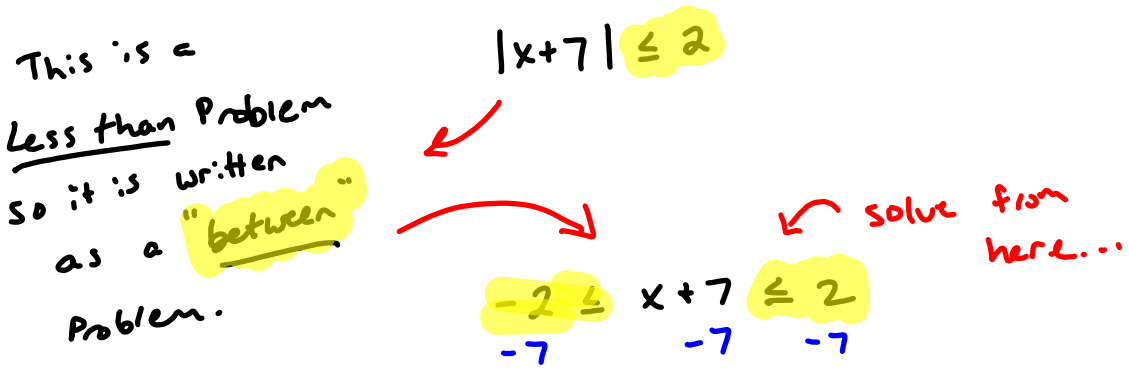
Main Idea:

1. Isolate the absolute Value.
2. If Less than: Break into a "Between" problem

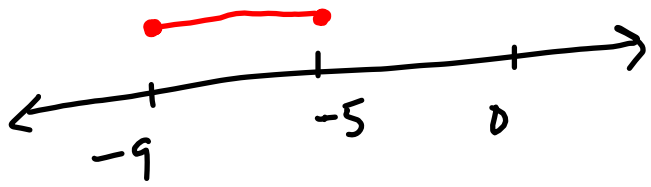
   If Greater than: Break into an "or" problem
3. Solve & graph those problems.

Ex: $|x + 7| - 8 \leq -6$

$+8 \quad +8$



$-9 \leq x \leq -5$



Ex: $\frac{2}{3}|4v+6|-2 \leq 10$

$+2 \quad +2$

$\frac{3}{2} \cdot \frac{2}{3}|4v+6| \leq \frac{12}{1} \cdot \frac{3}{2}$

Step 1: Isolate the Absolute Value

multiply straight across.

$\frac{36}{2} = 18$

$|4v+6| \leq 18$

Step 2: this is once again a Less than problem. write as a "Between" Problem.

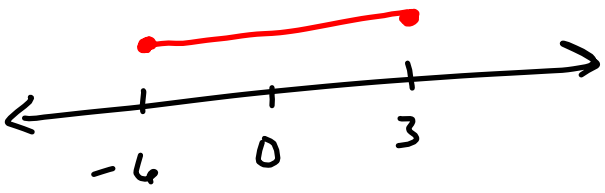
$-18 \leq 4v+6 \leq 18$

$-6 \quad -6 \quad -6$

← Solve

$\frac{-24}{4} \leq \frac{4v}{4} \leq \frac{12}{4}$

$-6 \leq v \leq 3$



Greater Than problems:

Ex: $3|d + 1| - 7 \geq -1$

$+7 \quad +7$

$\frac{3|d+1|}{3} \geq \frac{6}{3}$

$|d+1| \geq 2$

Step 1: Isolate Absolute Value

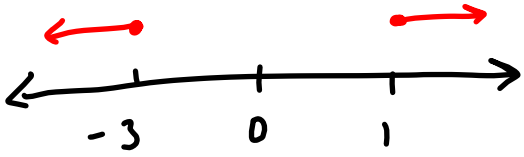
Step 2: Greater than problems split into an "or" problem!

Step 3: Solve Each.

$d+1 \leq -2$ or $d+1 \geq 2$

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

$d \leq -3$ or $d \geq 1$



You can't be sure you're dealing with a less than or greater than til you isolate the absolute value.

For example. This starts as a less than, but it won't stay that way...

Ex: $-2|2y - 3| + 4 \leq -6$

$-4 \quad -4$

Step 1: Isolate Absolute Value.

$-2|2y-3| \leq -10$

$-2 \quad -2$

Divided by a negative. Sign flips

$|2y-3| \geq 5$

Step 2: Greater than splits into an "or" problem.

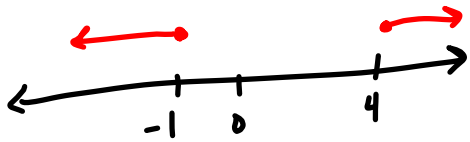
$2y-3 \leq -5$ or $2y-3 \geq 5$

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

$\frac{2y}{2} \leq \frac{-2}{2} \qquad \frac{2y}{2} \geq \frac{8}{2}$

Step 3: Solve.

$y \leq -1$ or $y \geq 4$



The takeaway is: Isolate the absolute value before judging what to do.

Homework:

Page 95

Numbers 9-17