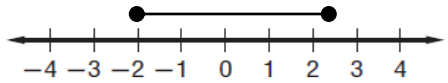
Absolute Value Inequalities

Let us to a look on the following inequalities $|x| \le 2$ and $|x| \ge 2$

$|x| \le 2$ In fact we are looking for all the numbers their absolute value less than or equal to 2. In other words the numbers at a distance less than or equal to 2 from the origin.

To solve such inequality, you take all numbers less than or equal to 2 and all numbers bigger than or equal to -2. For example $|1| \le 2, |-1| \le 2, |0| \le 2$, but if you try any number bigger than 2or any number less than -2, you will get a false statement for example $|3| \not\le 2, |-3| \not\le 2$.

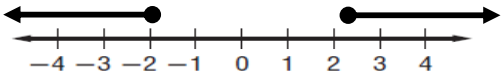
$x \le 2 \text{ and } x \ge -2$



$|x| \ge 2$ In fact we are looking for all the numbers their absolute value greater than or equal to 2. In other words the numbers at a distance greater than or equal to 2 from the origin.

To solve such inequality, you take all numbers greater than or equal to 2 or all numbers less than or equal to -2. For example $|4| \ge 2, |-4| \ge 2, |-10| \ge 2$, but if you try any number less than 2or any number greater than -2, you will get a false statement for example $|1| \not\ge 2, |-1| \not\ge 2$.

$x \le -2 \text{ and } x \ge 2$



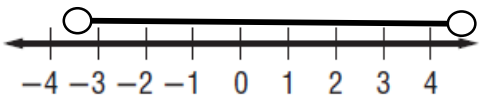
Example 1: Solve and graph $|2x-1| \prec 8$

$2x-1 \succ -8 \text{ and } 2x-1 \prec 8$

$2x \succ -7 \text{ and } 2x \prec 9$

$x \succ -3.5 \text{ and } x \prec 4.5$

The solution set is all numbers less than -3.5 and greater than 4.5.



Example 2: Solve and graph $|3x+2| \ge 5$

$3x+2 \ge 5 \text{ or } 3x+2 \le -5$

$3x \ge 3 \text{ or } 3x \le -7$

$x \ge 1 \text{ or } x \le \frac{-7}{3}$

The solution set is all numbers less than or equal $-\frac{7}{3}$ and greater than or equal 1.