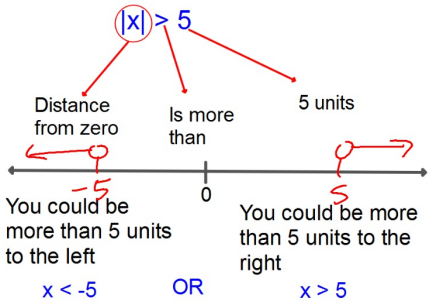
Solve: $|x| > 5$

| Properties | Absolute Value Inequalities |
|---|---|
| Let $k$ represent a positive real number. | |
| $\|x\| \geq k$ | is equivalent to $x \leq -k$ or $x \geq k$. |
| $\|x\| \leq k$ | is equivalent to $-k \leq x \leq k$. |

$|x| > 5$

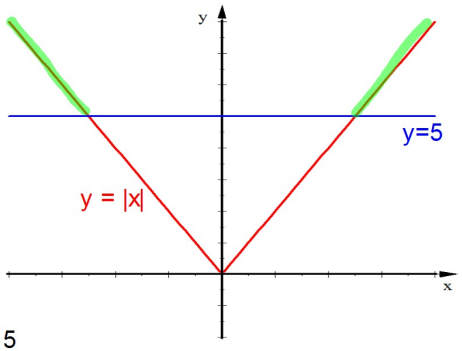
$x < -5$ or $x > 5$




Using a graph: $|x| > 5$

When is y=|x| greater than y=5?

When is y=|x| ABOVE Y=5?



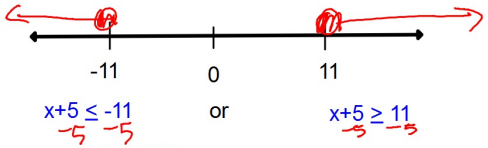

Sol: to the left of -5 or to the right of 5

$x < -5$ or $x > 5$

Solve this Absolute Value Inequality:

$|x + 5| \geq 11$

Where are you on a number line
if you are FARTHER than 11 units from zero?




$x+5 \leq -11$ or $x+5 \geq 11$

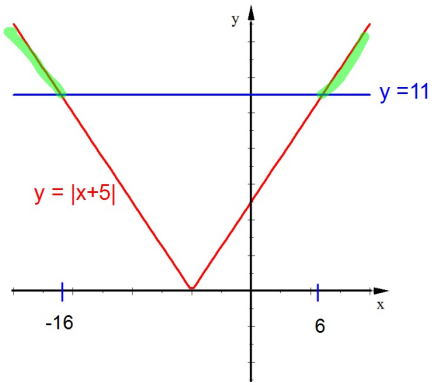
$-5 \quad -5 \qquad -5 \quad -5$

$x \leq -16$ OR $x \geq 6$

Let $k$ represent a positive real number.

| | | |
|---|---|---|
| $\|x\| \geq k$ | is equivalent to | $x \leq -k$ or $x \geq k$. |

$|x + 5| \geq 11$

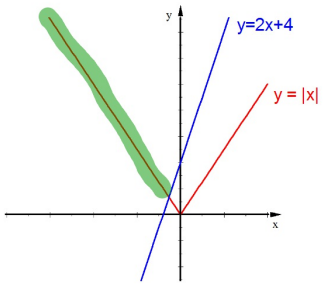



The graph of y =|x+5| is above the graph of y=11 to the left of -16 or to the right of 6.

Could there be only one interval for the solution to |x| > ____ ?

$|x| > 2x + 4$

Yes, the graph of y=|x| is above the graph of y=2x+4 only to the left of the point of intersection.




Solve $|2x+1| > 23$


$2x + 1 < -23$ or $2x + 1 > 23$

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

$\frac{2x}{2} < \frac{-24}{2} \qquad \frac{2x}{2} > \frac{22}{2}$

$x < -12$ or $x > 11$

Solve: $3|x - 4| + 7 > 40$

$-7 \quad -7$

$\frac{3|x-4|}{3} > \frac{33}{3}$

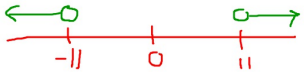
$|x-4| > 11$

$x-4 < -11$ or $x-4 > 11$

$+4 \quad +4 \qquad +4 \quad +4$

$x < -7$ or $x > 15$

The first step is to isolate the Absolute Value




You want to be MORE than 11 units from zero

Solve: $|x| \le 12$

| Properties | Absolute Value Inequalities |
|---|---|
| Let $k$ represent a positive real number. | |
| $\|x\| \ge k$ | is equivalent to $x \le -k$ or $x \ge k$. |
| $\|x\| \le k$ | is equivalent to $-k \le x \le k$. |

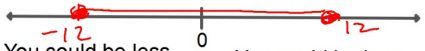
$|x| \le 12$

$-12 \le x \le 12$

$x \ge -12$ and $x \le 12$

$|x| \le 12$

Distance from zero — Is less than — 12 units




You could be less than 12 units to the left

You could be less than 12 units to the right

$x \ge -12$ AND $x \le 12$

$-12 \le x \le 12$

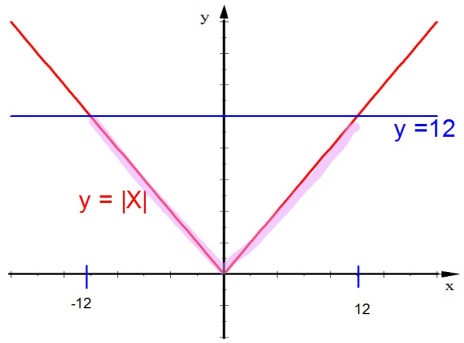
Using a graph: $|x| \le 12$

When is y=|x| less than y=12?

When is y=|x| BELOW Y=12?

Sol: BETWEEN -12 AND 12

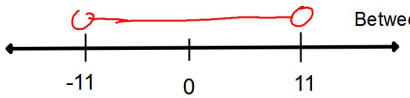
$-12 < x < 12$




Solve this Absolute Value Inequality:

$|x + 5| < 11$

Where are you on a number line
if you are CLOSER than 11 units from zero?




Between -11 and 11.

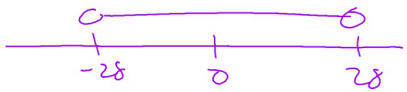
$-11 < x+5 < 11$

$-5 \quad -5 \quad -5$

$-16 < x < 6$

| $\lvert x \rvert \le k$ | is equivalent to | $-k \le x \le k.$ |
|---|---|---|

$|3x-7| < 28$




$3x-7 > -28$
$+7 \quad +7$
$3x > -21$
$x > -7$

and

$3x-7 < 28$
$+7 \quad +7$
$3x < 35$
$x < \frac{35}{3}$

$-7 < x < \frac{35}{3}$

$\frac{2|5x+3|}{2} = \frac{18}{2}$

$|5x+3| = 9$


$5x+3 = -9$ or $5x+3 = 9$

$5x = -12$ or $5x = 6$

$x = -12/5$ or $x = 6/5$