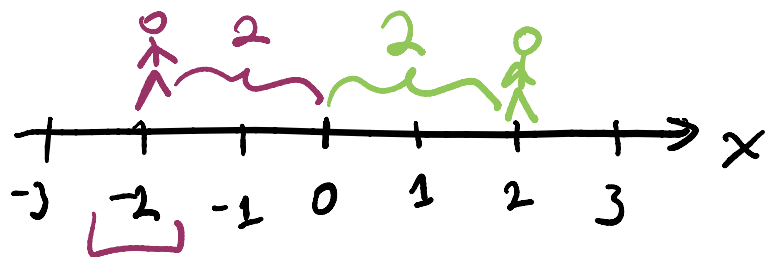


Absolute Value Functions & Inequalities

Sunday, September 6, 2020 10:25 AM



Absolute value: "how far away are you from zero?"

↳ makes things positive

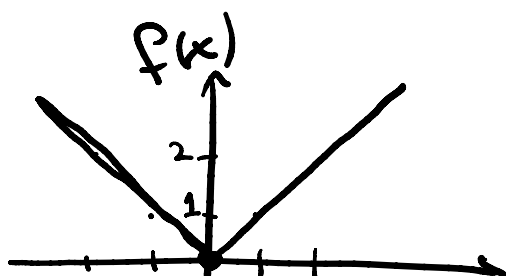
$$|2| = 2, \quad |-2| = 2.$$

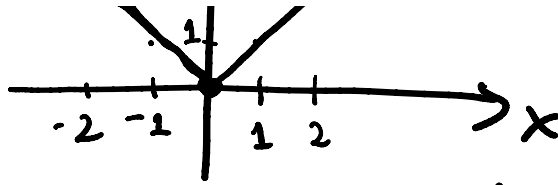
Absolute Value Functions:

$$f(x) = |x|$$

x	$f(x)$
-2	2
-1	1
0	0
1	1
2	2

$$\Rightarrow f(x) = \begin{cases} x & , x \geq 0 \\ -x & , x < 0 \end{cases}$$





Solving Equations With Abs Val.

Ex. $|x| = 2$. What could x be?

$$x = 2: |x| = 2 \quad \checkmark$$

$$x = -2: |x| = 2 \quad \checkmark$$

Ex. $3|x+1| = 6$

• Isolate abs. val:

$$|x+1| = \frac{6}{3}$$

$$|x+1| = 2$$

Thing inside abs.
val. is positive.

$$x+1 = 2$$

thing inside abs val.
is negative.

$$x+1 = -2$$

• solve for x in each eqn
separately.

$$\boxed{x = 1}$$

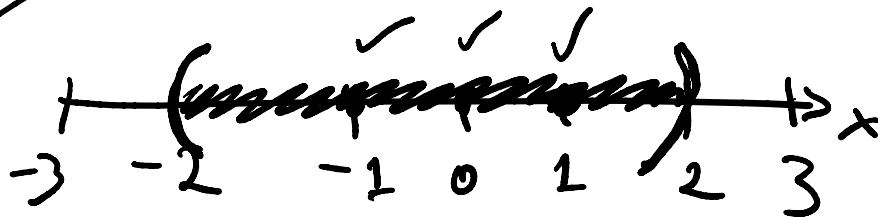
$$\boxed{x = -3}$$

Solving Inequalities with Abs. Val.

Solving Inequalities with Abs. V.

Ex.

$$|x| < 2$$



$$\begin{aligned} \hookrightarrow | -1 | &= 1 < 2 \\ | 3 | &= 3 > 2. \end{aligned}$$

Two possibilities:

- when x is positive:

$$x < 2$$

- when x is negative:

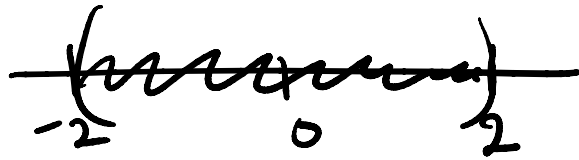
$$|x| = -x > 2$$

Two negatives make it positive

FLIP
SIGN
OF
INEQ.

$$x < 2 ; \quad \begin{aligned} -x &> 2 \\ x &> -2 \end{aligned}$$

$$x > -2$$



Ex.

$$2|x| - 1 > 0$$

- Isolate abs. val.

$$\frac{2|x|}{2} > \frac{1}{2}$$

$$|x| > \frac{1}{2}$$

x is positive

x is negative.

$$x > \frac{1}{2}$$

$$x < -\frac{1}{2}$$

