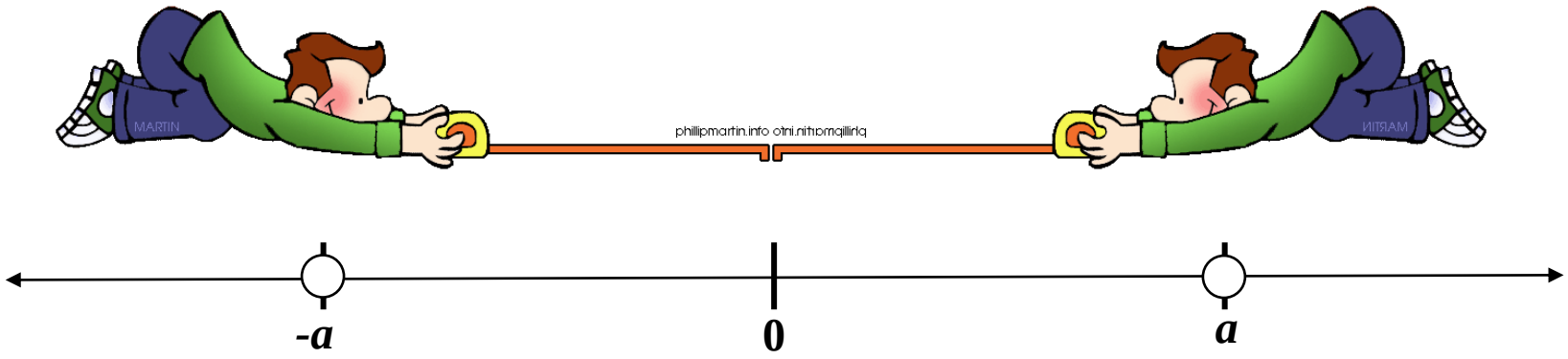
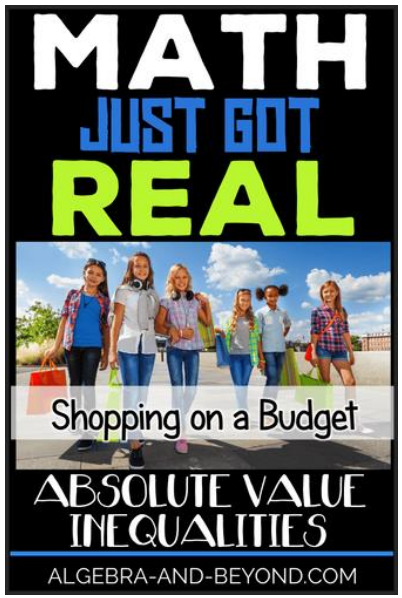
Absolute Value Inequalities:

Remember that absolute value represents distance on the number line from zero.

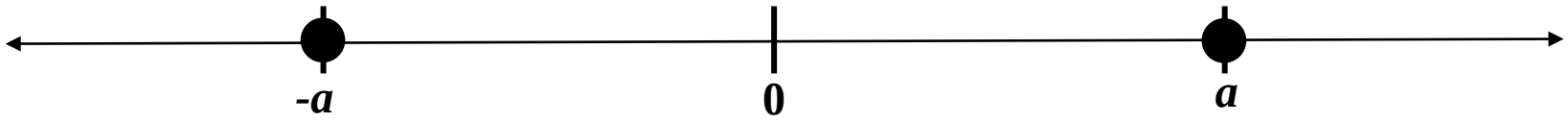
If $a > 0$, then what numbers would satisfy $|x| < a$?



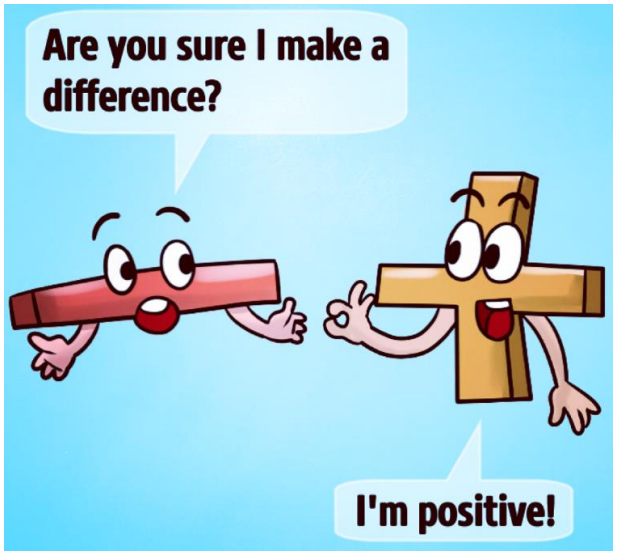
So $|x| < a$ is equivalent to $-a < x < a$.



If $a > 0$, then what numbers would satisfy $|x| \le a$?



So $|x| \le a$ is equivalent to $-a \le x \le a$.

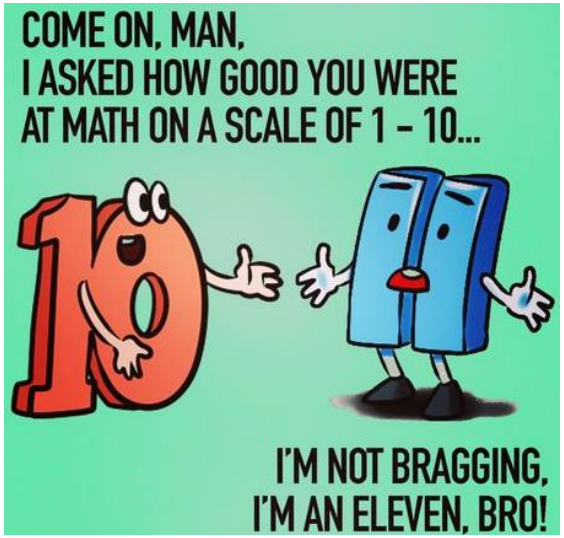


If $a \leq 0$, then what numbers would satisfy $|x| < a$?

Can a distance be less than zero?

If $a < 0$, then what numbers would satisfy $|x| \leq a$?

Can a distance be less than zero?



What about $|x| \leq 0$?

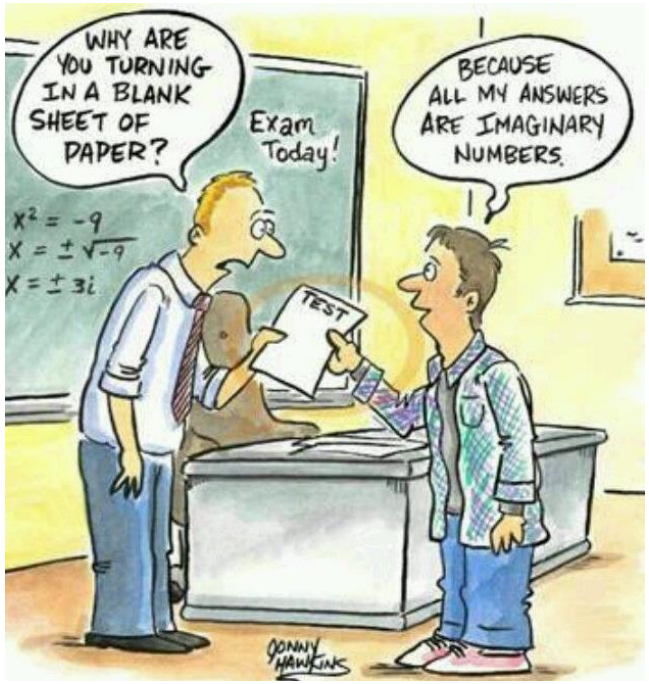
This can only be true if $|x| = 0$, and so $x = 0$.

Examples:

1. $|x| < 5$

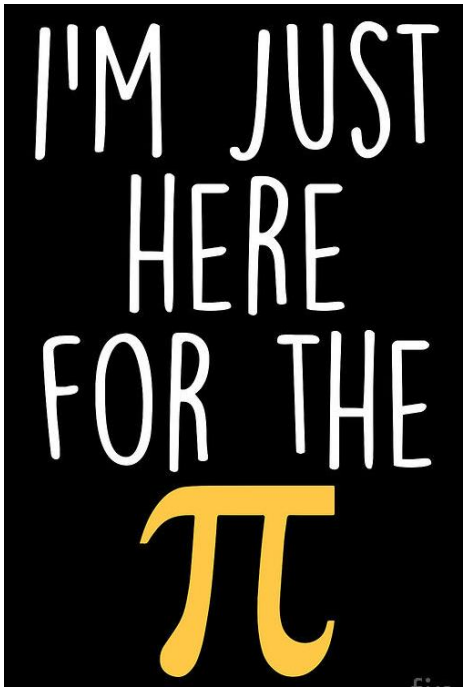
2. $|x| \leq 3$

3. $|x| < -1$


WHY ARE YOU TURNING IN A BLANK SHEET OF PAPER?
Exam Today!
BECAUSE ALL MY ANSWERS ARE IMAGINARY NUMBERS.
$x^2 = -9$
$x = \pm\sqrt{-9}$
$x = \pm 3i$
TEST
DONNY HAWKINS

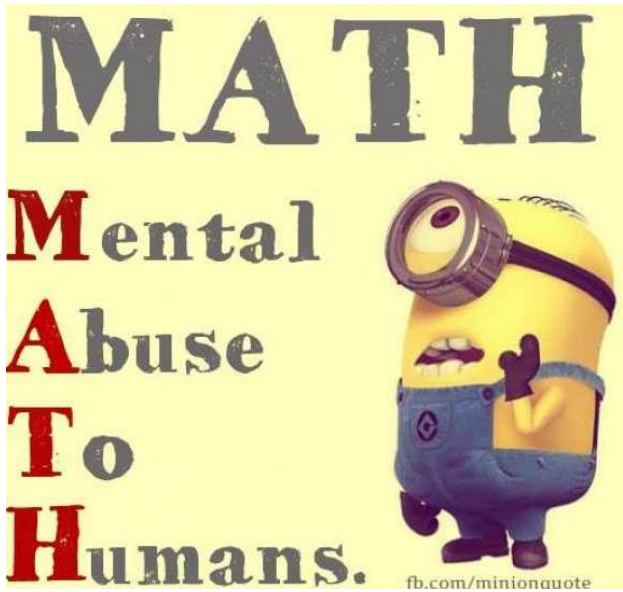
4. $|x+4| \leq 10$

5. $|5x+2| < 3$

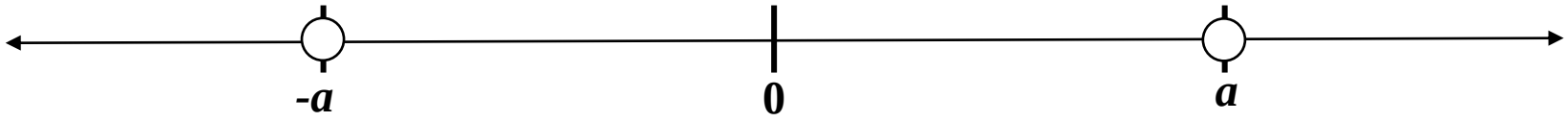


6. $\left|7-2x\right| \leq 0$

7. $\left|3x-7\right|+6 \leq 5$

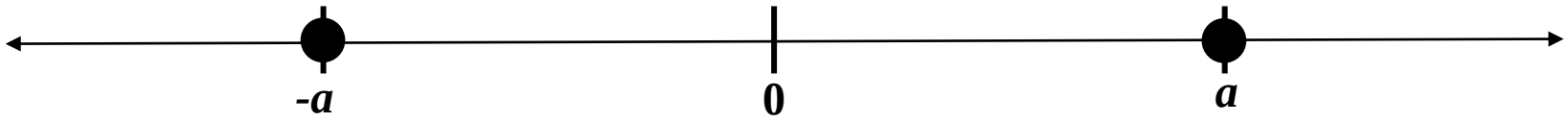


If $a > 0$, then what numbers would satisfy $|x| > a$?



So $|x| > a$ is equivalent to $x < -a \quad or \quad x > a$.

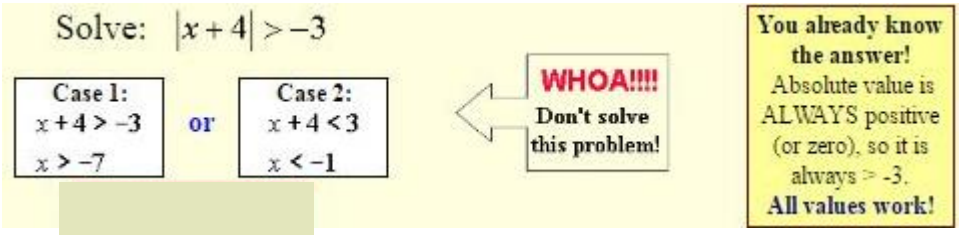
If $a > 0$, then what numbers would satisfy $|x| \geq a$?



So $|x| \leq a$ is equivalent to $x \leq -a \quad or \quad x \geq a$.

If $a < 0$, then what numbers would satisfy $|x| > a$?

Wouldn't all numbers have their distance to zero be greater than a negative number?



If $a \leq 0$, then what numbers would satisfy $|x| \geq a$?

Wouldn't all numbers have their distance to zero be greater than or equal to zero or a negative number?

What about $|x| > 0$?

This is true for all real numbers except zero.

Examples:

1. $|x| > 10$

The only way
to learn
mathematics
is to do
mathematics.

2. $|x| \geq 6$

3. $|x| > -2$

4. $|x-1|>0$

5. $|3x-4|>8$

6. $|2-9x| \geq 17$

7. $|x-7|+3 \geq 4$