Equations involving absolute value

Recall:

Absolute value is the distance away from zero

1. $|3| = \boxed{3}$

2. $|-2| = \boxed{2}$

3. $-|6| = \boxed{-6}$

4. $= |9-4| = |5| = \boxed{5}$

Simplify the expression:

Evaluate $|m+6|-14$ when $m=4$

$|4+6|-14$

$|10|-14$

$10-14$

$\boxed{-4}$

Solve the equation

$3x+4 = 4x-1$

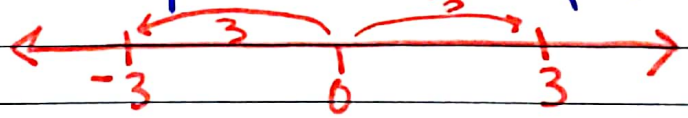
$-3x \quad -3x$

$4 = x-1$

$+1 \quad +1$

$\boxed{5 = x}$

When solving absolute value equations you will always have 2 case, positive and negative

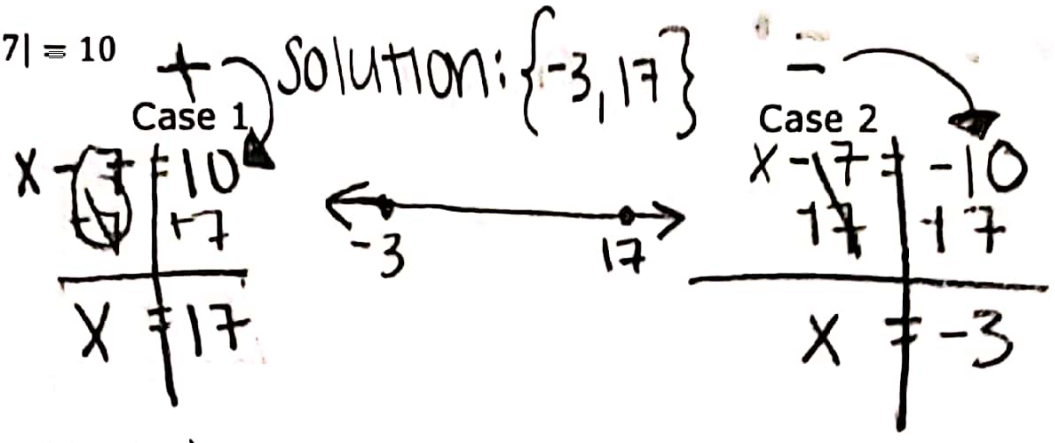


$|-3| = 3$ $\quad |3| = 3$

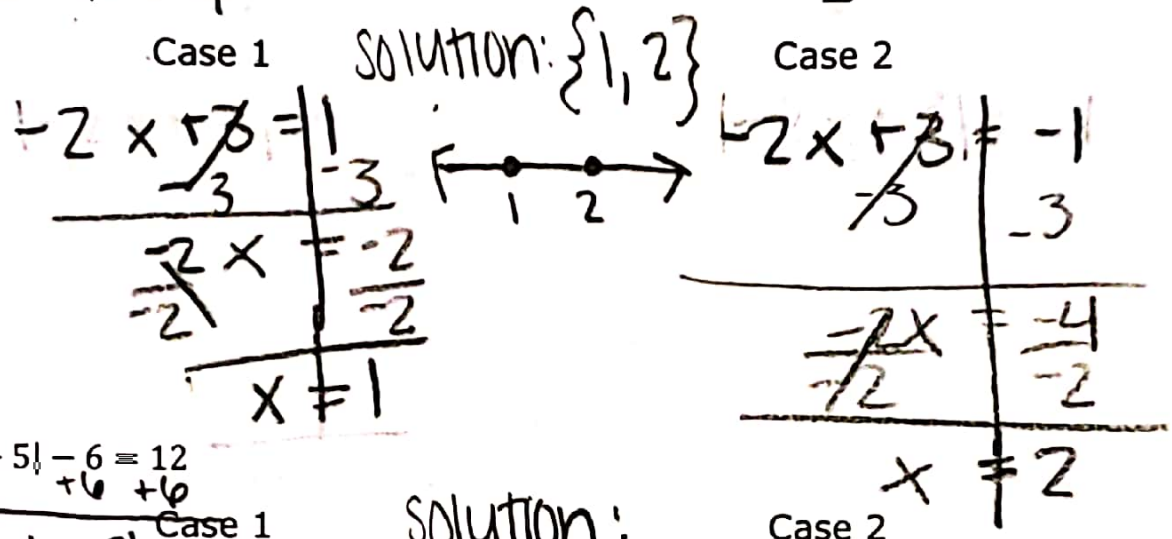
Always do it from least to greatest

Absolute Value Equations

1. $|x-7|=10$

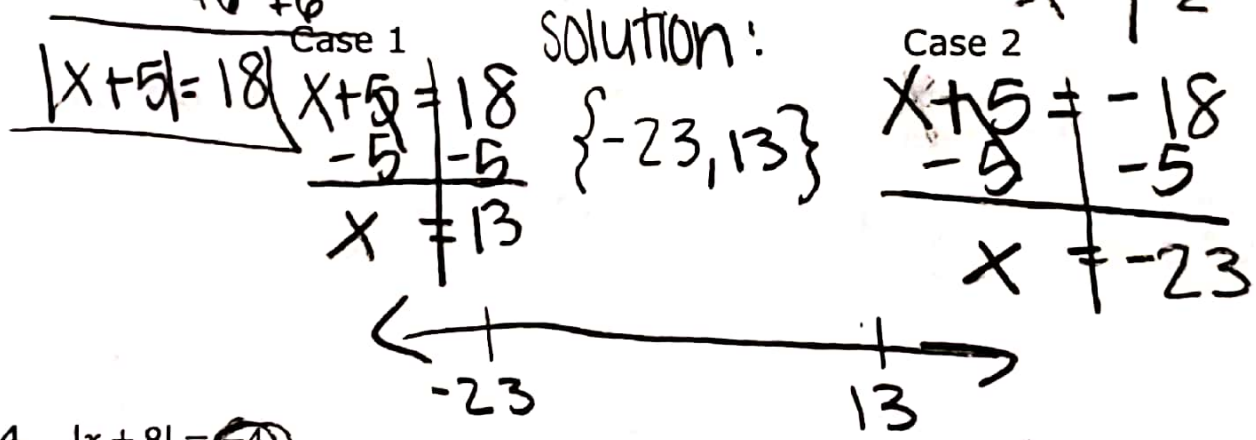


2. $|-2x+3|=1$



3. $|x+5|-6=12$

$+6 \quad +6$



4. $|x+8|=-4$

x = 4

Distance cannot be Negative so there is no solution

5. $\frac{5(|2x+3|)}{5} = \frac{10 \cdot 5}{5}$

$|2x+3| = 50$

Case 1

$2x+3 = 50$

$-3 \quad -3$

$\frac{2x}{2} = \frac{47}{2}$

$x = \frac{47}{2}$

Solutions: $\{-\frac{53}{2}, \frac{47}{2}\}$

Case 2

$2x+3 = -50$

$-3 \quad -3$

$\frac{2x}{2} = \frac{-53}{2}$

$x = \frac{-53}{2}$

1. Ice cream should be stored at 5 degrees Fahrenheit with an allowance for 5 degrees. Write and solve an equation to find the maximum and minimum temperatures which ice cream should be stored.

Solutions: $\{0, 10\}$

$|x-5| = 5$

$x-5 = 5$

$+5 \quad +5$

$x = 10$

$x-5 = -5$

$+5 \quad +5$

$x = 0$

2. The Red Rocks Amphitheater located in Denver, Colorado, is the only naturally occurring amphitheater. The acoustic qualities here are such that a maximum of 20,000 people, plus or minus 1000, can hear natural voices clearly.

a. Write an equation involving an absolute value that represents the number of people that can hear natural voices at the amphitheater.

b. Find the maximum and minimum number of people that can hear natural voices clearly in the amphitheater.

c. What is the range of people in part b?

(a) $|x - 20000| = 1000$

(b) $x - 20000 = 1000$

$+20000 = 20000$

$x = 21000$

$x - 20000 = -1000$

$+20000 = +20000$

$x = 19000$

$\{19000, 21000\}$

(c) Between 19000 and 21000

3. Determine whether the following statements are *sometimes, always, or never true* if c is an integer:

a. The value of $|x+1|$ is greater than zero.

b. The solution of $|x+c| = 0$ is greater than 0.

c. The inequality $|x| + c < 0$ has no solution.

d. The value of $|x+c| + c$ is greater than zero.