Lesson #4: Section 1.5

By the end of the lesson you will be able to solve ***absolute value equations*** by:

~ Using the original non-absolute value equation &
~ Using the "evil twin" equation

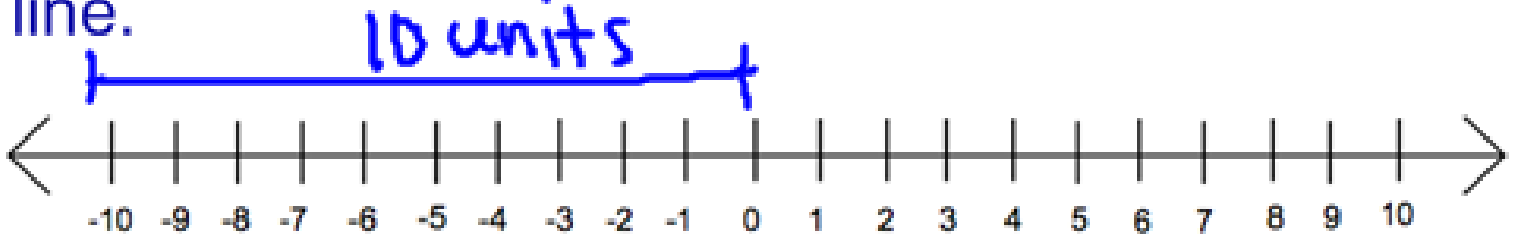
Lesson #4: Section 1.5

What is an Absolute Value?

1. $|3| =$ 3
2. $|-10| =$ 10
3. $|-2| =$ 2

Why do we make them positive?

The **Absolute Value** is the distance from Zero on the number line.



Lesson #4: Section 1.5

Example 1:

Evaluate $|3x-6| + 3.2$ if $x = -2$

$$= |3(-2)-6| + 3.2$$

$$= |-6-6| + 3.2$$

$$= |-12| + 3.2$$

$$= 12 + 3.2$$

$$= \boxed{15.2}$$

$$\begin{array}{r} 12.0 \\ +3.2 \\ \hline 15.2 \end{array}$$

Lesson #4: Section 1.5

Example 2 part A:

- For what values of x would this equation be true? $|x| = 3$

$x = 3, \; x = -3$

- For what values of x would this equation be true? $|x+2| = 5$

$x = 3 \qquad x = -7$

$(x+2) = 5 \qquad -(x+2) = 5$

$-x - 2 = 5$

$+2 \quad +2$

$-x = 7 \rightarrow x = -7$

Example 2 part B: The Evil Twin -*the negative side*

Solve $|x-25| = 17$

This means that we could be on the positive side and have

$$(x-25) = 17$$

or we could be on the negative side and have

$$\frac{-(x-25)}{-1} = \frac{17}{-1}$$

We can take -(x-25) = 17 and divide by a negative on both sides. Then we would have

$$(x-25) = -17$$

"Okay, one time, but just remember who the evil twin in this family really is."

Lesson #4: Section 1.5

Example 2: The Evil Twin *-the negative side*

Solve $|x-25| = 17$

So we have two options our equation could be:

$(x-25) = 17$ or $(x-25) = -17$

$+25 \quad +25$

$x = 42$

$+25 \quad +25$

$x = 8$

$25 - 17 = 8$

Example 2: The Evil Twin *-the negative side*

Solve $|x-25| = 17$

So we have two options our equation could be:

$(x-25) = 17$ **or** $(x-25) = -17$

$+25 \quad +25$ $\qquad$ $+25 \quad +25$

$x = 42$ $\qquad$ $x = 8$

Example 3:

Solve $|x+6| = 18$

So we have two options our equation could be:

$x + 6 = 18$ **or** $x + 6 = -18$

$-6 \quad -6$ $\qquad$ $-6 \quad -6$

$x = 12$ $\qquad$ $x = -24$

Example 4:

You MUST get the absolute value alone first before you do "evil twins"!!!

Solve $3|x + 6| = 36$

$\frac{3|x+6|}{3} = \frac{36}{3}$

$|x+6| = 12$

So we have two options our equation could be:

$x + 6 = 12$ **or** $x + 6 = -12$

$-6 \quad -6$ | $-6 \quad -6$

$x = 6$ | $x = -18$

Check: $x = 6$

$3|6+6| \stackrel{?}{=} 36$

$3|12| \stackrel{?}{=} 36$

$3(12) \stackrel{?}{=} 36$

$36 = 36$ ✓

Check: $x = -18$

$3|-18+6| \stackrel{?}{=} 36$

$3|-12| \stackrel{?}{=} 36$

$3(12) = 36$ ✓

Example 5:

You MUST get the absolute value alone first before you do "evil twins"!!!

Solve $|2x + 7| - 5 = 0$

$+5 \quad +5$

$|2x+7| = 5$

$2x+7 = 5$

$-7 \quad -7$

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

$x = -1$

$2x+7 = -5$

$-7 \quad -7$

$\frac{2x}{2} = \frac{-12}{2}$

$x = -6$

Lesson #4: Section 1.5

Example 5.1:

Solve $|2x + 7| + 5 = 0$

$-5 \quad -5$

$|2x+7| = -5$

What happens if an absolute value is supposedly equals a negative number? Can that happen?

no Solution

You MUST get the absolute value alone first before you do "evil twins"!!!

Example 6:

Solve $-2|2x-7| - 1 = -35$

$+1 \quad +1$

$-2|2x-7| = -34$

$-2 \quad -2$

$|2x-7| = 17$

Go to next slide →

$$|2x-7| = 17$$

$$2x-7 = 17$$
$$+7 \quad +7$$
$$\frac{2x}{2} = \frac{24}{2}$$
$$x = 12$$

$$2x-7 = -17$$
$$+7 \quad +7$$
$$\frac{2x}{2} = \frac{-10}{2}$$
$$x = -5$$

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By the end of the lesson you will be able to solve ***absolute value equations*** by:

~ Using the original non-absolute value equation &
~ Using the "evil twin" equation

Can you?

Homework:

Assignment #4:

Remember:

You MUST get the absolute value alone first before you do "evil twins"!!!

If you don't, you will get the problem wrong.