Algebra 1: 1.6 Solving Absolute Value Equations

Recap/Warmup

In your own words, what does absolute value mean? A number's distance from 0 (on a # line)

Find the solution. | x | = 15

$x = 15$ and $x = -15$

Find the solution. | x | = -15

NOT possible

NO Solutions

you can't have a negative distance from 0.

Absolute Value Equations almost always have two solutions. (See previous slide) Here's a step-by-step to solve them easily.

1. Get absolute value by itself. (move everything else to the other side)

2. Split into two possibilities.

3. Solve each of them.

$$|x - 3| + 5 = 18$$

$$-5 \quad -5$$

$$|x - 3| = 13$$

$$x - 3 = 13 \qquad\qquad x - 3 = -13$$

$$+3 \quad +3 \qquad\qquad +3 \quad +3$$

$$x = 16 \quad \& \quad x = -10$$

Ex: Solve $-2|5x-1|-3=-11$

$\quad\quad\quad\quad\quad\quad +3 \quad +3$

$\frac{-2|5x-1|}{-2}=\frac{-8}{-2}$

$|5x-1|=4$

split

$5x-1=4$ | $5x-1=-4$
$+1 \quad +1$ | $+1 \quad +1$

$\frac{5x}{5}=\frac{5}{5}$ | $\frac{5x}{5}=\frac{-3}{5}$

$x=1$ & $x=-\frac{5}{3}$

Absolute Value bars are NOT parenthesis, don't distribute into them!

Divide by the -2 here instead.

Even if x's are on the other side, you do the same thing.

Solve: $|2x+12| = 4x$

$2x+12 = 4x$
$-2x \quad -2x$

solve each

$2x+12 = -4x$
$-2x \quad -2x$

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

$x = 6$

$\frac{12}{-6} = \frac{-6x}{-6}$

$\cancel{x = -2}$

1. Get abs. value by itself

2. split

3. solve each

check answers

$|2(6)+12| = 4(6)$
$|12+12| = 24$
$|24| = 24$
True

$|2(-2)+12| = 4(-2)$
$|-4+12| = -8$
$|8| = -8$
Not True

When solving certain types of problems, the steps needed to solve can sometimes cause you to get answers that don't work in the original problem. These are called Extraneous Solutions. This is one of those cases. Check your answers to see if they both work.

Homework:

Pages 42-43

Numbers 16-23, 46, 49, 50