UNIT 2 DAY 1 NOTES SOLVING ABSOLUTE VALUE EQUATIONS

Recall Warm-up: Work with your Partner!

a) $|-6+1| =$ $|-5| = 5$

b) *What does* **Absolute Value** *mean*?? distance from 0 on # line.

c) What is the absolute value of 3? 3 What is the absolute value of -3? 3

d) Solve the following equation for x: |x| = 3. $x=3, x=-3$

e) In general, an absolute value equation can never equal a negative.

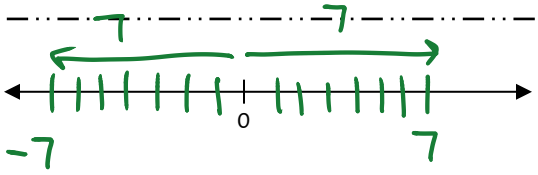
f) Solve for x *(be careful!)*: |x| = -3.

No solution (distance never neg. #)

Example 1: Solve |x| = 7.

$x=7, x=-7$

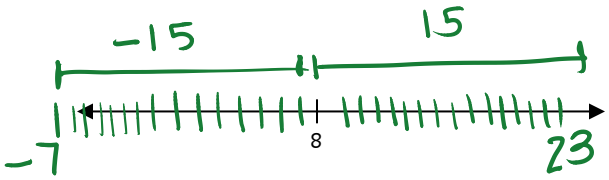
"distance between x and 0 is 7"



Example 2: |x - 8| = 15

$x-8=15$ $x=23$

$x-8=-15$ $x=-7$

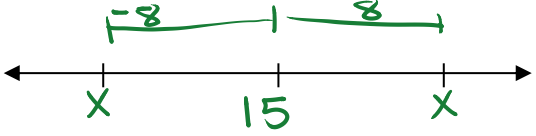


"distance from x to 8 is 15."

Let's make sense of this:

Allison lives at 15 Sycamore Drive, and Sarah lives 8 houses away. Where does Sarah live?

Let's draw this:



Written in words: The distance from my house x to house 15 is 8.

How about a mathematical equation to represent the visual representation? $|x-15|=8$

$x-15=8$, $+15 \quad +15$, $x=23$

$x-15=-8$, $+15 \quad +15$, $x=7$

The solutions: $x=23, x=7$

Solving Absolute Value Equations

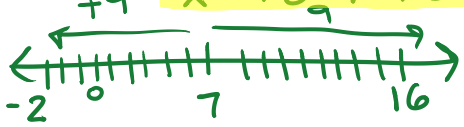
Step 1: Isolate the absolute value expression.
Step 2: To get rid of the absolute value symbol, break it up into 2 equations.
Step 3: Solve each equation for x.
Step 4: Check the solutions by substituting both solutions into the original problem.

Let's use a process.

Practice: Solve the absolute value equations.

1. $|r - 7| = 9$

Distance from x to 7 is 9.



$r = -2, r = 16$

2. $|3x - 1| = 8$

$3x - 1 = 8$ $\quad +1 \quad +1$

$\frac{3x}{3} = \frac{9}{3}$

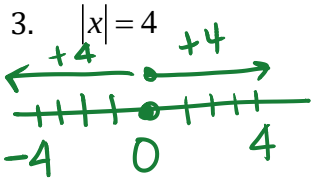
$3x - 1 = -8$ $\quad +1 \quad +1$

$\frac{3x}{3} = \frac{-7}{3}$

$x = 3, \quad x = -\frac{7}{3}$

Partner Practice: Solve the absolute value equations.

3. $|x| = 4$



$x = -4, 4$

4. $|x - 8| = 14$

$x - 8 = 14$ $\quad +8 \quad +8$

$x = 22$

$x - 8 = -14$ $\quad +8 \quad +8$

$x = -6$

$x = 22, -6$

5. $|4x + 3| = 3$

$4x + 3 = 3$ $\quad -3 \quad -3$

$\frac{4x}{4} = \frac{0}{4}$

$x = 0$

$4x + 3 = -3$ $\quad -3 \quad -3$

$\frac{4x}{4} = \frac{-6}{4}$

$x = -\frac{3}{2}$

$x = 0, -3/2$

6. $|10 - 2x| = -4$

$10 - 2x = -4$ $\quad -10 \quad -10$

$\frac{-2x}{-2} = \frac{-14}{-2}$

$x = 7$

$10 - 2x = 4$ $\quad -10 \quad -10$

$\frac{-2x}{-2} = \frac{-6}{-2}$

$x = 3$

$x = 7, 3$

Did you check? NO solution

7. $|3x + 3| = 4$

$|3x + 3| = 3$

$3x + 3 = 3$ $\quad -3 \quad -3$

$\frac{3x}{3} = \frac{0}{3}$

$x = 0$

$3x + 3 = -3$ $\quad -3 \quad -3$

$\frac{3x}{3} = \frac{-6}{3}$

$x = -2$

$x = 0, -2$

8. $|2c - 4| + 3 = -7$ $\quad -3 \quad -3$

$|2c - 4| = -10$

$2c - 4 = -10$ $\quad +4 \quad +4$

$\frac{2c}{2} = \frac{-6}{2}$

$c = -3$

$2c - 4 = 10$ $\quad +4 \quad +4$

$\frac{2c}{2} = \frac{14}{2}$

$c = 7$

$c = -3, 7$

Did you check? NO solution