**COLLEGE PREP**

**SECTION 1.6 - Absolute Value Equations and Inequalities**

**Objectives:**

* Solve absolute value equations and inequalities
* Solve applied problems including absolute values.

**DEFINITION:** An absolute value is a distance. This means we have both positive and negative answers that correspond to distances left and right from our central value.

Note on two special cases: |u|=0 is equivalent to u=0, so there’s only one solution. If a<0, there will be no solution, because an |u| is always going to revert to a positive value, it’s solutions don’t need to be positive, but the absolute value itself does!

**EXAMPLES:**

A) |x|=3 Answer: x = 3 and x = -3, so {3, -3}

B) |x|= -4 No solution!

***SOLVING EQUATIONS WITH ABSOLUTE VALUES:***

Step 1: Isolate the absolute value (move anything added or subtracted or multiplied to the absolute value). DO NOT MOVE PIECES WITHIN THE ABSOLUTE VALUE!

Step 2: Check the equation. Will you have one solution or no solution? If not, separate the equation into two pieces – one with a positive answer, and one with a negative answer.

Step 3: Solve each equation.

Step 4: CHECK YOUR ANSWER!

**EXAMPLES:**

C) |2x + 3| - 1 = 6

|2x + 3| = 7 Isolate.

2x + 3 = 7 and 2x + 3 = -7

2x = 4 and 2x = -10

X = 2 and x = -5 Answer: {2, -5} Go back and check!

D) |3 – x|+2 = 1

|3 – x| = -1 Answer: or { }

***SOLVING EQUATIONS WITH TWO ABSOLUTE VALUES:***

**Rule:**

In other words, leave the first equation the same, but make everything in the second absolute value negative.

**EXAMPLE:**

E) Solve |x + 1| = |2x + 3|

x+1 = 2x+3 and x+1 = -(2x+3)

-2 = x and x + 1 = -2x-3

3x = -4

Answer:

***ABSOLUTE VALUE INEQUALITIES:***

Follow the same steps as before. There are a couple of things to consider, though:

**Inequalities with <**

Rule:

NOTES: |u|<0 has no real solution. has one solution, u = 0. If a is a negative, there is no solution.

**EXAMPLE:**

F) Solve and graph:

Rewrite:

Answer: [-6, 2] 

G) Solve and graph |3-2x| + 1 < 6

Inequalities with >

Rule:

**EXAMPLE:**

H) Solve and graph |2x + 5| >7

2x + 5 < -7 OR 2x+5 >7

2x < -12 Or 2x >2

x < -6 or x > 1

Answer: 

**EXAMPLE:**

I) The inequality represents a human body temperature (measured in Farenheit) that is considered “unhealthy.” Solve the inequality and interpret the results.

Answer:

SO: a human temperature should range between 97.1 and 100.1 to be healthy.

Homework: Pg. 122: # 57-74 all, 81, 82