Equations with No Solution or Infinite Solutions

Objective:

-Solve equations that have no solution or infinite solutions

Equations with infinite solutions

- In the equation **2x = x + 3**, there is only one solution: 3, because 3 is the only number for x that would make both sides equal.

- Try to come up with an equation in which **every number** could work for x.

What value of x makes the equation true?

$x + 5 = x + 10$ Nothing!

$x + 10 = 10 + x$ Any number!

$x + x = 2x + 0$ Any number!

$2x = 3x$ $x = 0$

$x - 10 = x$ Nothing!

$2x + 6 = 2(x + 3)$ Any number!

What happens with these?

- $0x=8$ vs. $8x=0$

No solution.

$x=0$ is the solution

- $4x=5x$ vs. $4=5$

False → No solution

Dividing by zero…

- $0/anything = 0$ **(so x = 0)**
- $anything/0 = undefined$

(So no solution)

What value of x makes the equation true?

$$2x + 6 = 2(x + 3)$$

$$x + 10 = 10 + x$$

$-x$ $-x$

$10 = 10$ True.

Infinite Solutions

- If you ever have the exact same thing on both sides
  - $5 = 5$
  - $2x - 8 = 2x - 8$
  - Etc.
- **Means EVERY NUMBER will work**

Important to realize:

- If the variables "go away" on BOTH SIDES of the equation, it will either have no solution or infinite solutions.

1 solution, no solutions or infinite solutions?

1. $5(x - 3) + 10 = 2x + 3x - 5$ Infinitely Many Solutions
2. $12 = 3(x + 5) - 3x$ No Solution
3. $x + 3 + 3x + 5 = 2x - 4 + 12 + 2x$ infinitely Many Solutions
4. $2(x + 3) = -2x + 6$ $x = 0$

Homework: "Special" Equations Worksheet