**Infinite Solutions, No Solution, One Solution**

**One Solution:**

2x + 4 = 4(x + 2)

2x +4 = 4x + 8

4 = 2x + 8

-4 = 2x

x = -2

Each expression is a linear expression. When solving for x, we found the x coordinate where the two linear expressions intersect. To find the y coordinate, you can substitute -2 into either expression and get 0. This means the lines cross at (-2, 0).



When linear expressions cross at 1 point, then we say there is “One Solution”

**No Solutions:**

5x + 10 = 5(x +3)

 5x + 10 = 5x + 15 (Notice how each expression is now linear and in mx + b form)

10 = 15

Both linear expressions have the same slope (5) but different y –intercepts (10 and 15). This means the lines are parallel and will never intersect. Therefore, there is no solution.

In other words, there is no value for x that we can substitute into the equation to make a true statement.



**Infinite Solutions:**

4x + 2 = 2(2x + 1)

4x + 2 = 4x + 2 (Notice how both linear expressions have the same slope (4) and y-intercept (2)

2 = 2 If we continue to simplify, then we will end up with a true statement,

 Or such as 2 = 2, or x = x.

 4x = 4x

 Or

 x = x

When we end up with a true statement, this means the two linear expressions are equivalent. If you were to graph each expression, you would be graphing the same line.



**Homework Assignment:**

1. Write an equation with x on both sides that represents 1 solution

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* 1. Show the algebraic steps that solve for the x value
	2. Substitute x into the equation and solve for y
	3. Create a graph that shows the two linear expressions intersecting
	4. Create a table that also shows the point of intersection
	5. Write a short paragraph that describes the meaning of “1 solution”
1. Write an equation with x on both sides that represents no solutions
2. Show the algebraic steps that solve for the x value
3. Graph each expression
4. Create a table for each expression
5. Write a short paragraph that describes the meaning of no solution and how you can identify it based on a table, graph and equation.
6. Write an equation with x on both sides that represents infinite solutions.
7. Show the algebraic steps that show there are infinite solutions
8. Graph each expression
9. Create a table for each expression
10. Write a short paragraph that describes the meaning of infinite solutions and how you can identify it based on a table, graph, and equation

Extra Credit:

Write a word problem for each example and describe how no solution, infinite solutions, or 1 solution apply to the real world meaning of your problem.