

Number of Solutions Notes

3/5/15

Steps

- ① Distribute
- ② Terms "jump" the fence
- ③ Combine like terms

$$3(x+4) = 3x+11$$

$$3x+12 = 3x+11$$

$$3x = 3x+11-12$$

$$3x-3x = 11-12$$

$$0 = -1$$

* there are no solutions
Not a true statement

Check

$$3(\quad + 4) = 3(\quad) + 11$$

$$2x+3 = 2x+7$$

No solution

\emptyset

$$2x+3 = 2x+7$$

$$-2x$$

$$2x+2x = 7-3$$

$$0 = 4$$

* Mathematicians are lazy, so $\emptyset = \text{no solution}$

$$2x+3 = 2x+3$$

Infinitely
many solutions
 \mathbb{R}

$$\begin{array}{r} 2x+3 = 2x+3 \\ \quad \quad \quad \leftarrow \quad \rightarrow -3 \\ \quad \quad \quad -2x \\ 2x+2x = 3+3 \\ \boxed{0 = 0} \end{array}$$

Check

$$x=5$$

$$2x+3 = 2x+3$$

$$2(5)+3 = 2(5)+3$$

$$10+3 = 10+3$$

$$13 = 13 \checkmark$$

$$x=-8$$

$$2(-8)+3 = 2(-8)+3$$

$$-16+3 = -16+3$$

$$-13 = -13 \checkmark$$

* Both are true statements

* It doesn't matter
what value x equals
because any number
will be a solution.

\mathbb{R} = infinitely many
solutions

$$22x+70 = 17x-95$$

one solution

$$x =$$

$$\begin{array}{r} 22x+70 = 17x-95 \\ \quad \quad \quad \leftarrow \quad \rightarrow -22x \\ \quad \quad \quad +95 \\ \underline{165} = \underline{-5x} \\ \quad \quad \quad -5 \\ \boxed{-33 = x} \end{array}$$

Examples

$$\underline{x+2x+1} = \underline{3x+2+3}$$

$$3x+1 = 3x+5$$

$$\begin{array}{ccc} & \leftarrow & \rightarrow \\ -3x & & -1 \end{array}$$

$$3x-3x = 5-1$$

$$0 = 4$$

\emptyset No solution

* Combine like terms first
then, move terms over the
fence

$0 = 4 \leftarrow$ Not a true statement