

Algebra Study Guide Part 1

1. Single Variable Equations

- Must have an equal sign
- Goal is to get the variable alone
- In order to do that, you must do the opposite operation around x

Ex: $2x + 3 = 11$ Undo addition with subtraction

$$\begin{array}{r} -3 \quad -3 \\ \hline 2x = 8 \quad \text{Undo multiplication with division} \\ \hline \div 2 \quad \div 2 \\ \hline x = 4 \end{array}$$

Ex: $7(2p + 3) - 8 = 6p + 29$ Distribute the 7

$$14p + 21 - 8 = 6p + 29 \quad \text{Combine like terms}$$

$$14p + 13 = 6p + 29 \quad \text{Get all the variables on one side and numbers on the other}$$

$$\begin{array}{r} -6p \quad -13 \quad -6p \quad -13 \\ \hline 8p = 16 \quad \text{Undo multiplication with division} \\ \hline \div 8 \quad \div 8 \\ \hline p = 2 \end{array}$$

Ex: $\frac{5x-14}{7} = 3$ Undo division with multiplication (to get rid of fractions, multiply by the denominator)

$$\begin{array}{r} *7 \quad *7 \\ \hline 5x - 14 = 21 \\ \hline +14 \quad +14 \\ \hline 5x = 35 \\ \hline \div 5 \quad \div 5 \\ \hline x = 7 \end{array}$$

d. # of solutions

- One solution, like the examples above
- Infinite solutions, when you end up with $x = x$ or $2 = 2$, these are true, but not helpful
- No solution, when you end up with something that is false, $0 = 2$

Ex: $2(x - 1) = 4 + 2x$

$$2x - 2 = 4 + 2x$$

$$\begin{array}{r} -2x \quad -2x \\ \hline -2 = 4 \quad \text{False, so No Solution} \end{array}$$

2. Single Variable Inequalities

- > Greater than
 - \geq Greater than or equal to
 - < Less than
 - \leq Less than or equal to
- Solve inequalities just like equations, get variable alone
 - *****When you multiply or divide the entire inequality by a negative number you must reverse the inequality symbol.

Ex: $-8x + 3 \leq 27$

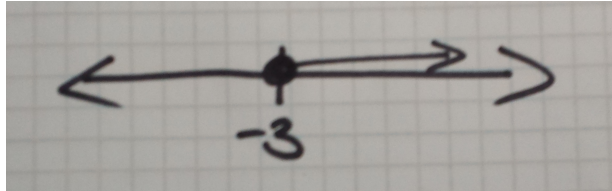
$$\begin{array}{r} -3 \quad -3 \\ \hline -8x \leq 24 \\ \hline \div -8 \quad \div -8 \quad \text{***Reverse the inequality symbol!!} \\ \hline x \geq -3 \end{array}$$

c. Then graph on a number line

$>, <$ Open circle \bigcirc

\geq, \leq Closed circle \bullet

To graph: $x \geq -3$ it says x is greater than or equal to -3 so the arrow points to the right with a closed circle on -3



To graph: $x < 6$ it says x is less than 6 so the arrow points to the left with an open circle on 6

