Everything Algebra

*Review your Integer Rules!

Expressions:

To **simplify** an expression, **combine (add), like terms**. The + sign represents a positive number, the - sign represents a negative number.

Example: $2x - 2 + 9 - 4x \rightarrow -2x + 7$

Distributing: Multiply the number on the outside of the parentheses by all terms inside the parentheses.

Examples: $2(2x - 8) \rightarrow 2(2x)$ and $2(-8) \rightarrow 4x - 16$
$-3(5x + 2) \rightarrow -3(5x)$ and $-3(2) \rightarrow -15x - 6$

Factor "undistribute":
To factor an expression:

1) Find the greatest common factor (GCF) of both terms

2) Put the GCF on the outside of the parentheses
3) Divide both terms by the GCF to find the terms inside the parentheses
4) CHECK! by distributing

Example: Factor $3x - 12 \rightarrow 3(x - 4)$
Factor $8x - 12 \rightarrow 4(2x - 3)$
Factor $15x + 10 \rightarrow 5(3x + 2)$

To **evaluate** an expression, **plug in** the given value for your variable in the expression and use order of operations to simplify.

Example: Evaluate $2x - 9$ for $x = -3$

$2(-3) - 9$

$-6 - 9$

-15

Adding and Subtracting Polynomials:

When **adding** polynomials you are distributing a +1, which makes all the terms stay the same. So you can ignore the parentheses and **combine like terms** as you would **normally**.

Example: $(2x + 9) + (-4x - 8) \rightarrow -2x + 1$

When **subtracting** polynomials, you are distributing a **-1** to the second polynomial in the parentheses. This will make **all the terms in the second parentheses their opposite**. Complete a giant **KEEP, CHANGE, CHANGE EVERYTHING** before combining like terms.

Example: $(3x - 11) - (2x + 2)$

KCCE: $(3x - 11) + (-2x + -2) \rightarrow x - 13$

Equations:

An equation has one solution for the variable. To solve an equation use the inverse operations to get the variable alone.

Inverses: addition and subtraction, multiplication and division

Whatever you do to one side of the equation you must do to the other to keep the sides equal.

In a two - step equation, undo the +/- first, then undo the ×/÷. Remember when dividing by a fraction it becomes multiplying by the reciprocal.

Examples:

$2x - 9 = 11$
$+9 \quad +9$
$\frac{2x}{2} = \frac{20}{2}$
$x = 10$

$(\frac{3}{2})\frac{2}{3}x = 4(\frac{3}{2})$
$x = 6$

$\frac{x}{3} + 8 = 12$
$-8 \quad -8$
$(3)\ \frac{x}{3} = 4(3)$
$x = 12$

Translating

Recall the words we use to represent our operations:

Add: and, plus, more than, increased by, sum, *add the initial(starting) amount
Subtract: fewer than, less than, decreased by, difference
Multiply: per, a(n), each, product
Divide: quotient, split

When translating equations, the total is what the expression equals.

Inequalities

An inequality has infinite solutions.

< less than

> greater than

≤ less than or equal to

≥ greater than or equal to

To graph an inequality, <, > get an open circle because it does NOT include the number in the solution

≤, ≥ get a closed circle because it DOES include the number in the solution

To correctly graph the direction of the arrow, **plug in** a number that makes the inequality true and graph in that direction.

We solve inequalities the **SAME EXACT** way we solve an equation, using the inverse operations. The only difference is the one **special rule: when multiplying or dividing BY a negative, you must reverse the inequality symbol to keep the inequality true.**

Examples:

$x - 9 < 4$

$+9 \quad +9$

$x < 13$

$2x + 8 > -10$

$-8 \quad -8$

$\frac{2x}{2} > \frac{-18}{2}$

$x > -9$

$-3x - 4 \leq 11$

$+4 \quad +4$

$* \quad \frac{-3x}{-3} \leq \frac{15}{-3}$

$* \; x \geq -5$

Graph an open circle at 13 and the arrow goes to the left since $12 < 13$

Graph an open circle at -9 and the arrow goes to the right since $-8 > -9$

Graph a closed circle at -5 and the arrow goes to the right since $-4 \geq -5$

Translating an inequality (put your 'x' on the left):

Less than <

Greater than >

At least ≥

At most ≤

No more than ≤