Algebra 1 Summer Assignment

This assignment will help you to prepare for Algebra 1 by reviewing some of the things you learned in Middle School. This will help prepare you for the challenges of algebra 1.

If you cannot remember how to complete a specific problem, there is an example at the top of each page. If additional assistance is needed, please use the following websites:

http://www.purplemath.com/modules/index.htm
www.khanacademy.com

http://regentsprep.org/Regents/math/ALGEBRA/math-ALGEBRA.htm

NAME: _____

Combining Like Terms

What are Like Terms?

The following are like terms because each term consists of a single variable, x, and a numeric coefficient.
2x, 45x, x, 0x, -26x, -x

Each of the following are like terms because they are all constants.
15, -2, 27, 9043, 0.6

What are Unlike Terms?

These terms are not alike since different variables are used.
17x, 17z

These terms are not alike since each y variable in the terms below has a different exponent.
$15y, 19y^2, 31y^5$

Although both terms below have an x variable, only one term has the y variable, thus these are not like terms either.
19x, 14xy

Examples - Simplify Group like terms together first, and then simplify.

$2x^2 + 3x - 4 - x^2 + x + 9$

$2x^2 + 3x - 4 - x^2 + x + 9$
$= (2x^2 - x^2) + (3x + x) + (-4 + 9)$
$= \mathbf{x^2 + 4x + 5}$

$10x^3 - 14x^2 + 3x - 4x^3 + 4x - 6$

$10x^3 - 14x^2 + 3x - 4x^3 + 4x - 6$
$= (10x^3 - 4x^3) + (-14x^2) + (3x + 4x) - 6$
$= \mathbf{6x^3 - 14x^2 + 7x - 6}$

Directions: *Simplify each expression below* by combining like terms.

1) $-6k + 7k$

2) $12r - 8 - 12$

3) $n - 10 + 9n - 3$

4) $-4x - 10x$

5) $-r - 10r$

6) $-2x + 11 + 6x$

7) $-v + 12v$

8) $x + 2 + 2x$

9) $5 + x + 2$

10) $2x^2 + 13 + x^2 + 6$

11) $2x + 3 + x + 6$

12) $2x^3 + 3x + x^2 + 4x^3$

Order of Operations

"Operations" means things like add, subtract, multiply, divide, squaring, etc. But, when you see an expression: $7 + (6 \times 5^2 + 3)$ ... what part should you calculate first?

Warning: Calculate them in the wrong order, and you will get a wrong answer !

So, long ago people agreed to follow rules when doing calculations, and they are:

First: Do things in Parentheses Example:

✓ $6 \times (5 + 3) = 6 \times 8 = \mathbf{48}$

✗ $6 \times (5 + 3) = 30 + 3 = 33$ (wrong)

Next: Exponents (Powers, Roots) Example:

✓ $5 \times 2^2 = 5 \times 4 = \mathbf{20}$

✗ $5 \times 2^2 = 10^2 = 100$ (wrong)

Then: Multiply or Divide before you Add or Subtract. Example:

✓ $2 + 5 \times 3 = 2 + 15 = \mathbf{17}$

✗ $2 + 5 \times 3 = 7 \times 3 = 21$ (wrong)

HINT: go left to right. Example:

✓ $30 \div 5 \times 3 = 6 \times 3 = \mathbf{18}$

✗ $30 \div 5 \times 3 = 30 \div 15 = 2$ (wrong)

Remember it by PEMDAS = "Please Excuse My Dear Aunt Sally"

After you have done "P" and "E", just go from left to right doing any "M" ***or*** "D" as you find them.

Then go from left to right doing any "A" ***or*** "S" as you find them.

Simplify:

1. $4+10 – (5+7) =$
2. $4 \times 2(4^2 + 6 =$
3. $3 \times 4^2 + 8 =$
4. $6(2+1) + 1^3 – 2 =$
5. $1 – (8^2 + 6) =$
6. $(10+2 – 3)^2 =$
7. $5 \times 4 + 9 =$
8. $18 – 7^2 + 5 =$
9. $7 + (6 \times 5^2 + 3) =$
10. $8 + 3(3 – 4) \div 2 =$

Distributive Property

In algebra, the use of parentheses is used to indicate operations to be performed. For example, the expression $4(2x-y)$ indicates that *4 times the binomial* $2x-y$ is $8x-4y$

Additional Examples:

1. $2(x+y) = 2x+2y$
2. $-3(2a+b-c) = -3(2a)-3(b)-3(-c)=-6a-3b+3c$
3. $3(2x+3y) = 3(2x)+3(2y)=6x+9y$

1. $3(4x + 6) + 7x =$
2. $7(2 + 3x) + 8 =$
3. $9 + 5(4x + 4) =$
4. $12 + 3(x + 8) =$
5. $3(7x + 2) + 8x =$
6. $6m + 3(2m + 5) + 7 =$
7. $5(m + 9) - 4 + 8m =$
8. $3m + 2(5 + m) + 5m =$
9. $6m + 14 + 3(3m + 7) =$
10. $4(2m + 6) + 3(3 + 5m) =$

Solving Equations

An equation is a mathematical statement that has two expressions separated by an equal sign. The expression on the left side of the equal sign has the same value as the expression on the right side. To *solve an equation* means to determine a numerical value for a variable that makes this statement true by isolating or moving everything except the variable to one side of the equation. To do this, combine like terms on each side, then add or subtract the same value from both sides. Next, clear out any fractions by multiplying **every** term by the denominator, and then divide every term by the same nonzero value. Remember to keep both sides of an equation equal, you must do exactly the same thing to each side of the equation.

Examples:

a. $x + 3 = 8$

$-3 \quad -3$

$x = 5$

3 is being added to the variable, so to get rid of the added 3, we do the opposite, subtract 3.

b. $5x - 2 = 13$

$+2 \quad +2$

$5x = 15$

$\frac{5x}{5} = \frac{15}{5}$

$x = 3$

First, undo the subtraction by adding 2.

Then, undo the multiplication by dividing by 5.

Solve

1.) $4x = -32$

2.) $-7x + 7 = -70$

3.) $5x + 1 = 26$

4.) $2x + 7 = 31$

5.) $-3x + 2 = -13$

6.) $8 + 7x = -15$

7.) $-3x = 18$

8.) $5x + 5 = 35$

Evaluating Expressions

Simplify the expression first. Then evaluate the resulting expression for the given value of the variable.

Example $3x + 5(2x + 6) =$ _____ if $x = 4$
$3x + 10x + 30 =$
$13x + 30 =$
$13(4) + 30 = \underline{82}$

1. $y + 9 - x =$ ____; if $x = 1$, and $y = 3$

2. $8 + 5(9 - 4x) =$ _____ if $x = 2$

3. $6(4x + 1) + x =$ _____ if $x = 5$

4. $8(2m + 1) + 3(5m + 3) =$ _____ if $m = 2$

5. $7(3 + 5m) + 2(m + 6) =$ _____ if $m = 2$

6. $2(4m + 5) + 2(4m + 1) =$ _____ if $m = 5$

7. $5(8 + m) + 2(m - 7) =$ _____ if $m = 3$

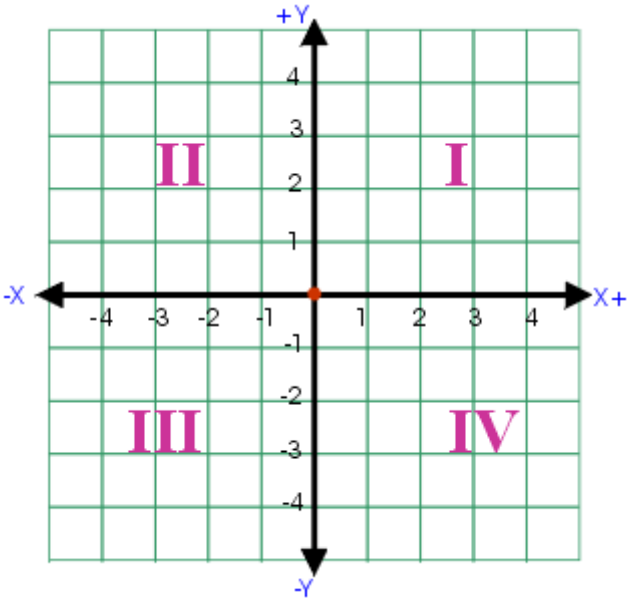
8. $y \div 2 + x =$ ____; if $x = -1$, and $y = 2$

The Coordinate Plane

This is a **coordinate plane**. It has two axes and four quadrants. The two number lines form the axes. The horizontal number line is called the **x-axis** and the vertical number line is called the **y-axis**.

The center of the coordinate plane is called the **origin**. It has the coordinates of (0,0).

Locations of points on the plane can be plotted when one coordinate from each of the axes are used. This set of x and y values are called **ordered pairs**.



State the quadrant or axis that each point lies in.

1) $J\,(5, 10)$ _____

2) $G(-6, 8)$ _____

3) $D(-8, -4)$ _____

4) $A\,(-8, 1)$ _____

5) $I\,(1, 9)$ _____

6) $F\,(9, 0)$ _____

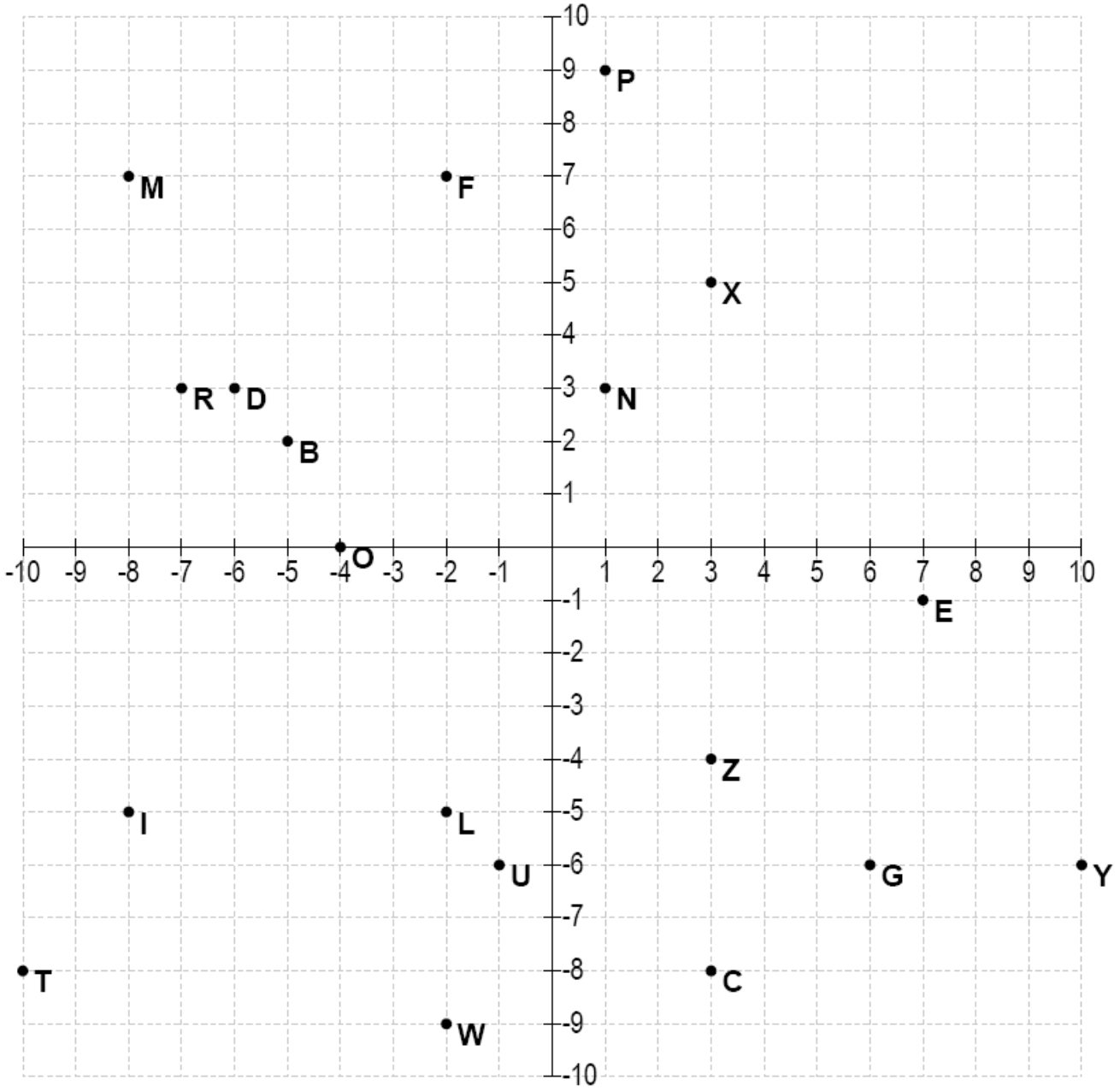
7) $C\,(0, 5)$ _____

8) $H\,(6, -9)$ _____

9) $E\,(6, 0)$ _____

10) $B\,(1, 1)$ _____

Plotting Points



Write the coordinates of each point:

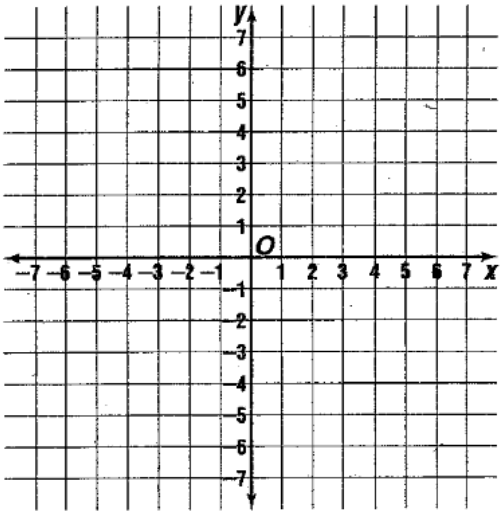
1) Point L: _____ 6) Point F: _____ 11) Point N: _____ 16) Point O: _____

2) Point U: _____ 7) Point X: _____ 12) Point D: _____ 17) Point W: _____

3) Point B: _____ 8) Point I: _____ 13) Point Y: _____ 18) Point T: _____

4) Point P: _____ 9) Point G: _____ 14) Point R: _____

5) Point C: _____ 10) Point M: _____ 15) Point E: _____



Plot and label the following points on the coordinate plane to the left.

1. M (2, -4)
2. A (0, 4)
3. T (-3, 2)
4. H (-5, -4)
5. R (6, 6)
6. O (-7, 0)
7. X (-1, 5)

Change the following numbers written in scientific notation INTO standard form

1. Move the decimal point right or left to obtain a number n such that $1 \leq n < 10$.
2. Count the number of places *p* that the decimal point has been moved.
3. Multiply n by 10^{p} if the decimal point was moved to the left. Multiply n by 10^{-p} if the decimal point was moved to the right. Be sure to eliminate any meaningless zeros.

Example 1

Write in scientific notation:

a. 10,300,000
b. 0.00089

a. We need to move the decimal point to the left 7 places to get a number n such that $1 \leq n < 10$.

$$10300000 = 1.0300000$$

So we multiply n by 10^{7}. The zeros to the right of the 3 are meaningless, so we eliminate them, getting

$$1.03 \times 10^{7}$$

b. We need to move the decimal point to the right 4 places to obtain a number n such that $1 \leq n \leq 10$. Then we multiply the result by 10^{-4} and eliminate the meaningless zeros on the left.

$$0.00089 = 00008.9 \times 10^{-4} = 8.9 \times 10^{-4}$$

1. 8.2×10^{7}

2. 1.73×10^{2}

3. 1.37×10^{6}

4. 3.02×10^{-4}

5. 5.248×10^{-5}

6. 6.91×10^{-2}

Tables of Values (T – Charts)

Any equation can be graphed using a table of values. A table of values is a graphic organizer or chart that helps you determine two or more points that can be used to create your graph.

In order to graph a line, you must have two points. For any given linear equation, there are an infinite number of solutions or points on that line. Every point on that line is a solution to the equation.

In a T – Chart:

- The first column is for the x coordinate. For this column, you can choose any number.
- The second column is for the y value. After substituting your x value into the equation, your answer is the y coordinate.
- The result of each row is an ordered pair. Your ordered pair is the x value and the y value. This is the point on your graph.

Example: Determine solutions to the equation $y = 3x + 2$

1) Draw a T-chart

x	y

2) Select values for x:

x	y
-1	
0	
1	

3) Evaluate the equation for each x value:

$y = 3x + 2$ $x = -1$
$y = 3(-1) + 2$
$y = -3 + 2$
$y = -1$

$y = 3x + 2$ $x = 0$
$y = 3(0) + 2$
$y = 0 + 2$
$y = 2$

$y = 3x + 2$ $x = -1$
$y = 3(1) + 2$
$y = 3 + 2$
$y = 5$

4) Complete the chart with the values:

x	y
-1	-1
0	2
1	5

Determine three solutions to each equation:

1. $y = 2x+1$
2. $y = 3x – 6$
3. $y = -x -1$
4. $y = -2x - 7$
5. $3y = -24$
6. $2y = 4x +10$