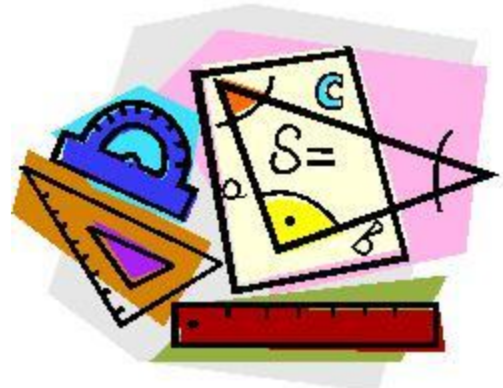
Geometry A Summer Assigment



This assignment will help you to prepare for Geometry A by reviewing some of the things you learned in 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

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.

$$\mathbf{2x^2 + 3x - 4 - x^2 + x + 9}$$

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

$$\mathbf{10x^3 - 14x^2 + 3x - 4x^3 + 4x - 6}$$

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

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

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

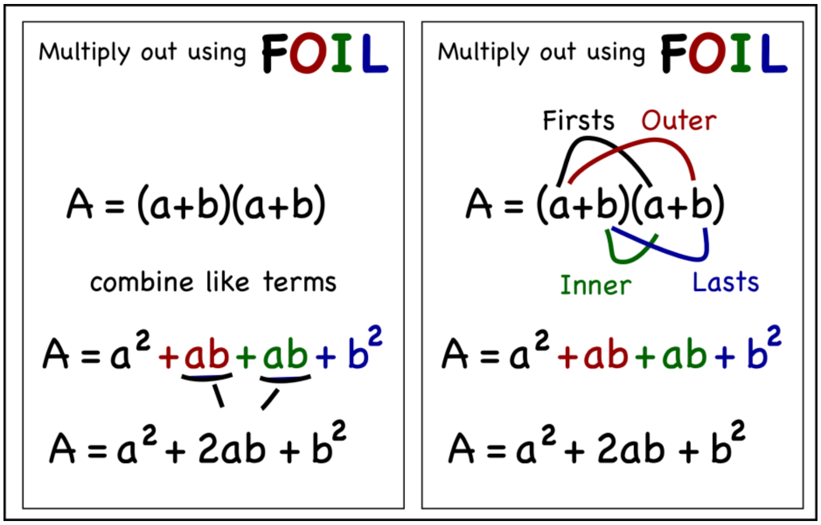
7. $5(m + 9) - 4 + 8m =$

8. $3m + 2(5 + m) + 5m =$

9. $6m + 14 + 3(3m + 7) =$

10. $4(2m + 6) + 3(3 + 5m) =$

<u>Multiplying Two Binomials - FOIL</u>



Examples- Multiply the following binomials.

a) $(2x - 4)(x + 6)$
$=2x^2+\underline{12x-4x}-24$
$=2x^2+8x-24$

b) $(3x - 5)^2 = (3x - 5)(3x - 5)$
$=9x^2 \underline{-15x-15x}+25$
$=9x^2-30x+25$

Find each product:

1. $(y + 6)(y + 5)$

2. $(2x + 1)(x + 2)$

3. $(4x - 6)^2$

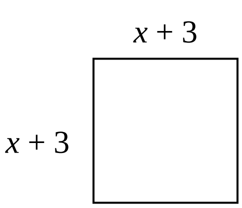
4. $(2x + 1)^2$

5. $(2x + y)(2x – y)$

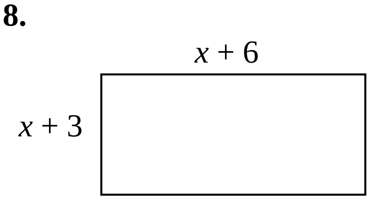
6. $(3x - y)(x + 2y)$

Find the area of each shape. (*HINT: Area = length * width)*

7.



8.



<u>Evaluating Expressions</u>

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

Example $3x + 5(2x + 6) =$ _____ if $x = 4$
$3x + 10x + 30 =$
$13x + 30 =$
$13(4) + 30 =$ <u>82</u>

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

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

3. $6(4x + 7) + x =$ _____ if $x = 2$

4. $9(2m + 1) + 2(5m + 3) =$ _____ if $m = 2$

5. $7(7 + 5m) + 4(m + 6) =$ _____ if $m = 1$

6. $2(4m + 5) + 8(3m + 1) =$ _____ if $m = 3$

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

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

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. $x + 3 = 8$

$$\begin{array}{r} x + 3 = 8 \\ \underline{\quad -3 \;\; -3} \\ x \quad = 5 \end{array}$$

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

b. $5x - 2 = 13$

$$\begin{array}{r} 5x - 2 = 13 \\ \underline{\quad +2 \;\; +2} \\ 5x \quad = 15 \\ \dfrac{5x}{5} = \dfrac{15}{5} \\ x = 3 \end{array}$$

First, undo the subtraction by adding 2.

Then, undo the multiplication by dividing by 5.

Solve

1.) $-7 - 4x = -31$

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

3.) $\dfrac{5x}{2} + 18 = 28$

4.) $\dfrac{3x}{2} + 7 = 31$

5.) $-1(x + 2) = -10$

6.) $8 - 7x = -13$

7.) $-3x - 1 = 17$

8.) $5(x + 1) = 35$

<u>Solving Equations with Variables on Both Sides</u>

If an equation has two terms with a variable, get the variables combined into one term by moving the variable with the smaller coefficient. To do this, add or subtract the same variable from both sides Remember, to keep both sides of an equation equal, we must do exactly the same thing to each side of the equation.

$$\begin{array}{rcl} 4x + 5 &=& x - 4 \\ \underline{-x \quad\quad} & & \underline{-x \quad} \\ 3x + 5 &=& -4 \end{array}$$

Then proceed as before.

$$\begin{array}{rcl} 3x + 5 &=& -4 \\ \underline{\quad -5} & & \underline{-5} \\ \frac{3x}{3} &=& \frac{-9}{3} \\ x &=& -3 \end{array}$$

Solve

1.) $5x + 8 = -2 + 6x$

2.) $-6 + 5x = 2x + 15$

3.) $10 + 2x + 2x = 7x - 17$

4.) $x + 2 = 6x - 13$

5.) $7x - 7 = -19 + 6x$

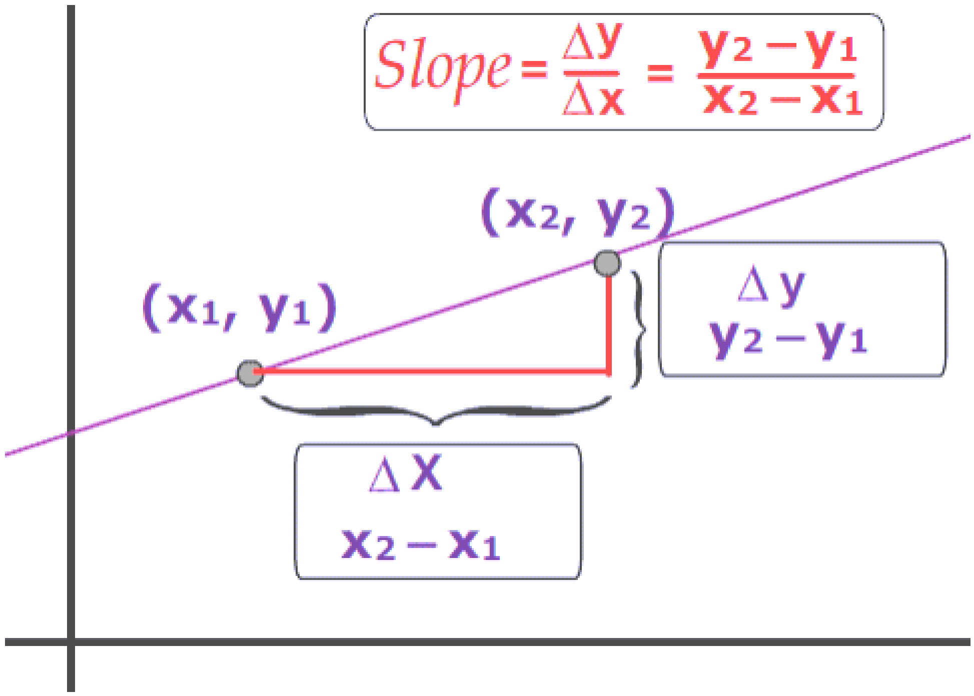
6.) $x^2 - 2x + 4 = x^2 - 7x - 6$

7.) $10 - 3x = -2x + 3$

8.) $9 + x = -3x - 3$

Slope of a Line

The slope of a line characterizes the general direction in which a line points. To find the slope, you divide the difference of the y-coordinates of a point on a line by the difference of the x-coordinates.



Example: Find the slope of a line through the points (4,3) and (1,2).

Starting with the point (4,3) $\quad \text{Slope} = \frac{y^2 - y^1}{x^2 - x^1} = \frac{3-2}{4-1} = \frac{1}{3}$

<u>OR</u> you can start with the point (1,2)

$$\text{Slope} = \frac{y^2 - y^1}{x^2 - x^1} = \frac{2-3}{1-4} = \frac{-1}{-3} = \frac{1}{3}$$

1) What is the slope of a line that goes through the points (-10,3) and (7,9) ?

2) A line passes through (2,10) and (8,7). What is its slope?

3) A line passes through (12,11) and (9,5). What is its slope?

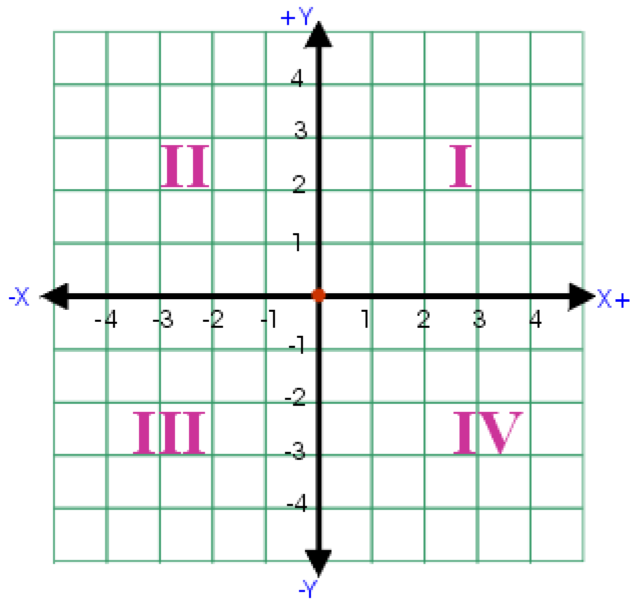
4) What is the slope of a line that goes through (4,2) and (4,5)?

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) $C(0, 5)$ ________________

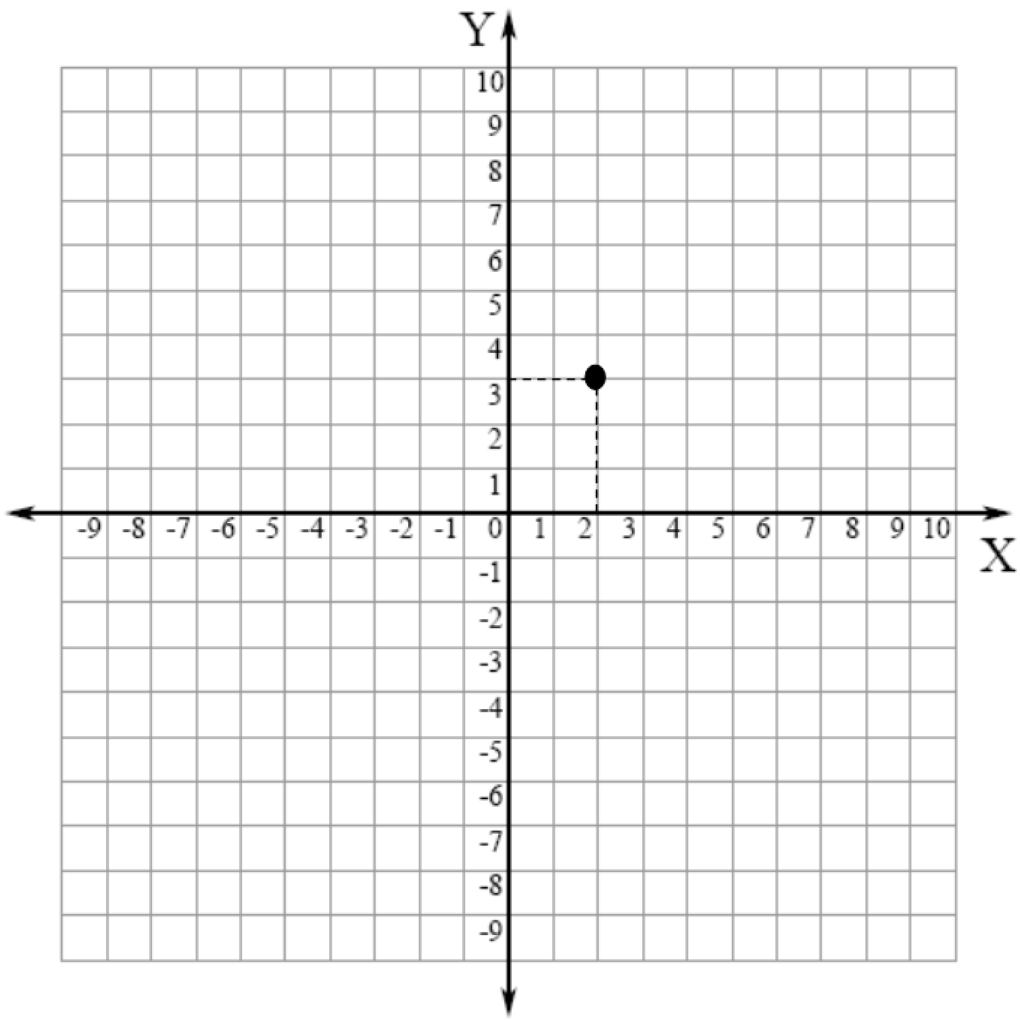
8) $H(6, -9)$ ________________

9) $E(6, 0)$ ________________

10) $B(1, 1)$ ________________

Plotting Points

The first coordinate of a plotted point is called the '**x**' coordinate. The 'x' coordinate is the horizontal distance from the origin to the plotted point. The second coordinate of a plotted point is called the '**y**' coordinate. The 'y' coordinate is the vertical distance from the origin to the plotted point. So, to locate the point: (2, 3) on our graph below, we start at the origin and move 2 units horizontally and 3 units vertically. When locating points, **positive** 'x' values are to the **right** of the origin, while **negative** 'x' values are to the **left** of the origin. Also, positive 'y' values are above the origin, while negative 'y' values are below the origin.



Plot each of the points on the graph:

(1) Point D at (0, 10)
(2) Point J at (-1, 6)
(3) Point O at (-8, 1)
(4) Point B at (-9, -3)
(5) Point E at (-4, -8)
(6) Point F at (5, 6)
(7) Point S at (-8, 2)
(8) Point H at (6, 8)
(9) Point P at (-9, -10)
(10) Point G at (-7, 9)
(11) Point Z at (-7, -5)
(12) Point Y at (0, -8)

<u>Simplifying Radicals</u>

Step 1) Find the largest perfect square that is a factor of the radicand
Step 2) Rewrite the radical as a product of the perfect square and its matching factor
Step 3) Simplify

Example: $\sqrt{8}$

Step 1) 4 is the largest perfect square that is a factor of 8
Step 2) The value is rewritten as the product of the square root of 4 and its matching factor of 2

$$\sqrt{8} = \sqrt{4}\sqrt{2}$$

Step 3) Simplify

$$\sqrt{8} = 2\sqrt{2}$$

Simplify the following:

1) $\sqrt{75}$ 2) $\sqrt{200}$ 3) $\sqrt{108}$

4) $\sqrt{32}$ 5) $\sqrt{26}$ 6) $\sqrt{250}$

How to Simplify Radicals with Coefficients

Let's look at $3\sqrt{8}$ to help us understand the steps involving in simplifying radicals that have coefficients. All that you have to do is simplify the radical like normal and, at the end, multiply the coefficient by any numbers that 'got out' of the square root.

Step 1) Find the largest perfect square that is a factor of the radicand (just like before)	4 is the largest perfect square that is a factor of 8
Step 2) Rewrite the radical as a product of the square root of 4 (found in last step) and its matching factor(2)	$3\sqrt{4}\sqrt{2}$
Step 3) Simplify	$3\sqrt{4}\sqrt{2} = 3 \cdot 2\sqrt{2}$
Step 4) Multiply original coefficient (3) by the 'number that got out of the square root ' (2)	$3 \cdot 2\sqrt{2} = 6\sqrt{2}$

Simplify the following:

1) $2\sqrt{80}$ 2) $4\sqrt{125}$ 3) $6\sqrt{20}$

4) $3\sqrt{60}$ 5) $5\sqrt{128}$ 6) $2\sqrt{27}$

Multiplying Radicals

Directions: Multiply or divide the following radical expressions. Express your final answer in ***simplest radical form***.

Multiplying Radicals		Steps
$(3\sqrt{25})(2\sqrt{5})$ $(3*2\sqrt{25*5})$ $6\sqrt{125}$ $6\sqrt{25}\sqrt{5}$ $6*5\sqrt{5}$ $=30\sqrt{5}$	$(-2\sqrt{9})^2$ $(-2\sqrt{9})(-2\sqrt{9})$ $4\sqrt{81}$ $4*9$ $=36$	1) Multiply outside numbers together and numbers under the radical together. 2) Simplify the radical into simplest radical form.

Practice:

1) $(3\sqrt{6})(5\sqrt{2})$	2) $(2\sqrt{3})(5\sqrt{3})$
3) $(\sqrt{7})^2$	4) $(4\sqrt{6})^2$

Dividing Radicals and Rationalizing the Demoninator

Dividing Radicals	Steps	Rationalize Denominator	Steps
$\frac{8\sqrt{48}}{4\sqrt{2}}$ $=2\sqrt{24}$ $=2\sqrt{4}\sqrt{6}$ $=2*2\sqrt{6}$ $=4\sqrt{6}$	1) Divide outside numbers together and numbers under the radical together. 2) Simplify the radical into simplest radical form.	$\frac{3}{\sqrt{2}}$ $=\frac{3}{\sqrt{2}}*\frac{\sqrt{2}}{\sqrt{2}}$ $=\frac{3\sqrt{2}}{\sqrt{2}*\sqrt{2}}$ $=\frac{3\sqrt{2}}{\sqrt{4}}=\frac{3\sqrt{2}}{2}$	To rationalize the denominator, we want to get the radical out of the denominator: 1) Multiply top and bottom of fraction by the radical that is in the denominator. 2) Simplify and write the radical into simplest radical form.

Practice:

1) $\sqrt{\frac{72}{8}}$	2) $\frac{6\sqrt{10}}{3\sqrt{2}}$
3) $\frac{2}{\sqrt{5}}$	4) $\frac{9}{\sqrt{7}}$