# Geometry B Summer Assignment

This assignment will help you to prepare for Geometry 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: ______________________________________________

# Reducing Fractions:

**To reduce a simple fraction, follow the following three steps:**

1. **Factor the numerator.**
2. **Factor the denominator.**
3. **Find the fraction mix that equals 1.**

Reduce $\frac{15}{6}$

**First:** Rewrite the fraction with the numerator and the denominator factored: $\frac{5\ x\ 3}{2\ x\ 3}$

**Second:** Find the fraction that equals 1. $\frac{5\ x\ 3}{2\ x\ 3}$ can be written $\frac{5}{2}$ x $\frac{3}{3}$ which in turn can be written $\frac{5}{2}$ x $1$ which in turn can be written $\frac{5}{2}$.

**Third:** We have just illustrated that $\frac{15}{6} = \frac{5}{2}$ Although the left side of the equal sign does not look identical to the right side of the equal sign, both fractions are equivalent because they have the same value. Check it with your calculator. 15 ÷ 6 = 2.5 and 5 ÷ 2 = 2.5. This proves that the fraction $\frac{15}{6}$ can be reduced to the equivalent fraction $\frac{5}{2}$.

Reduce:

1) $\frac{24}{36}$
2) $\frac{14}{18}$
3) $\frac{24}{36}$
4) $\frac{10}{50}$
5) $\frac{-36}{60}$

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

# Evaluating Expressions

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

Example $3x + 5(2x + 6) =$ ____ $if\ x = 4$
$3x + 10x + 30 =$
$13x + 30 =$
$13(4) + 30 = 82$

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

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

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

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

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

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

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

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. $x + 3 = 8$

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

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

b. $5x - 2 = 13$

$$\begin{aligned} 5x - 2 &= 13 \\ \underline{+2 \quad} & \underline{\; +2} \\ 5x &= 15 \\ \frac{5x}{5} &= \frac{15}{5} \\ x &= 3 \end{aligned}$$

First, undo the subtraction by adding

Then, undo the multiplication by dividing by 5.

Solve

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

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

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

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

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

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

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

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

# Solving Equations with Variables on Both Sides

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.

Then proceed as before.

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

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.) $9 + x = -\,3x - 3$

# Proportion

A proportion is a name we give to a statement that two ratios are equal. It can be written in two ways:

- two equal fractions, $\frac{a}{b} = \frac{c}{d}$

- using a colon, $a : b = c : d$

When two ratios are equal, then the cross products of the ratios are equal.

That is, for the proportion, $a : b = c : d$, $a \times d = b \times c$

Determine the missing value:

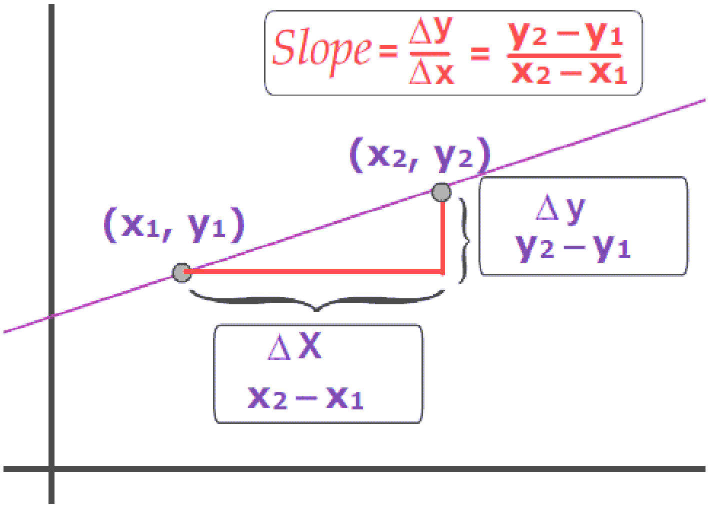
| | | |
|---|---|---|
| 1. $\frac{15}{p} = \frac{20}{8}$ | 2. $\frac{s}{10} = \frac{84}{20}$ | 3. $\frac{3}{y} = \frac{9}{12}$ |
| 4. $\frac{4}{12} = \frac{v}{3}$ | 5. $\frac{12}{28} = \frac{p}{21}$ | 6. $\frac{20}{12} = \frac{f}{9}$ |
| 7. $\frac{5}{9} = \frac{z}{27}$ | 8. $\frac{1}{4} = \frac{4}{q}$ | 9. $\frac{4}{h} = \frac{1}{2}$ |

State whether the ratios are proportional:

| | | | |
|---|---|---|---|
| 1. $\frac{35}{20} = \frac{7}{4}$ | 2. $\frac{3}{8} = \frac{32}{12}$ | 3. $\frac{5}{13} = \frac{40}{48}$ | 4. $\frac{9}{24} = \frac{3}{8}$ |
| 5. $\frac{52}{28} = \frac{40}{16}$ | 6. $\frac{10}{9} = \frac{20}{18}$ | 7. $\frac{10}{45} = \frac{2}{9}$ | 8. $\frac{8}{9} = \frac{2}{36}$ |

# 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) 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)

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 $(7,9)$?

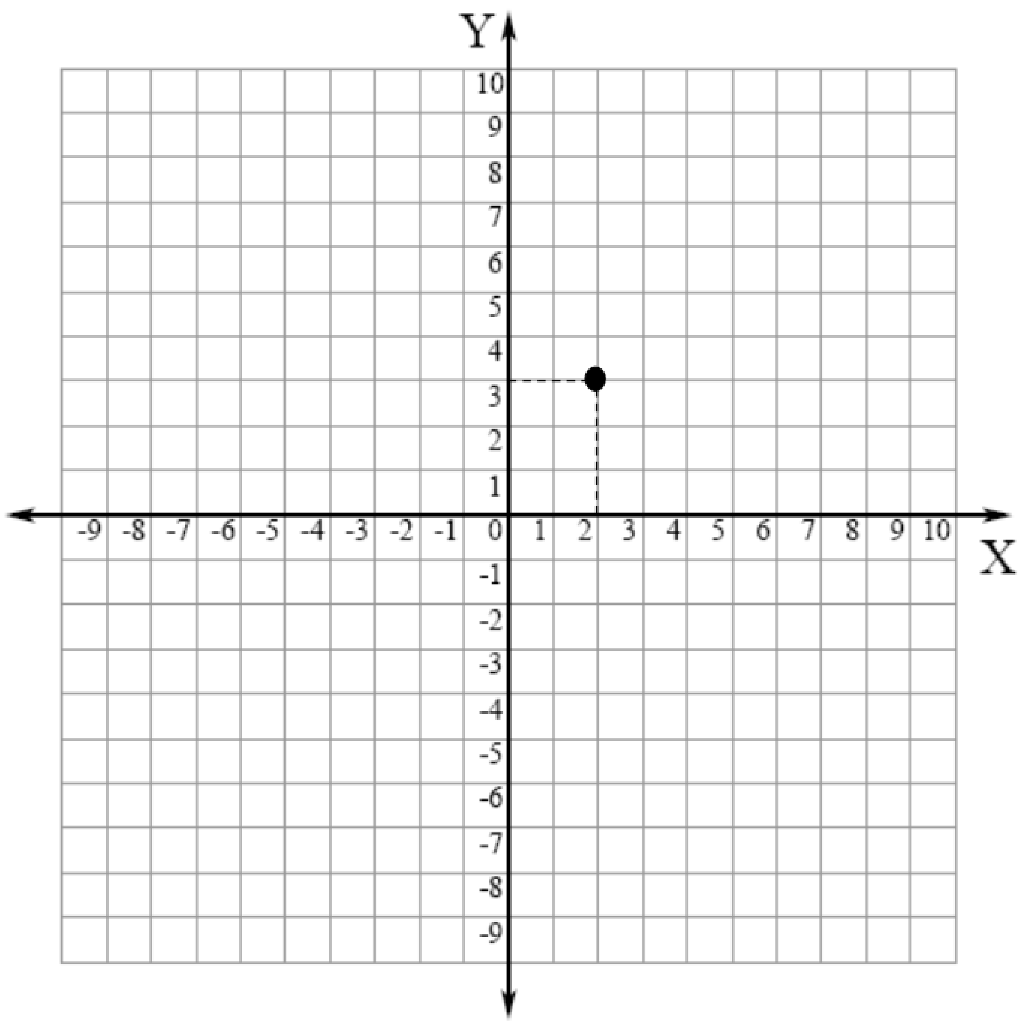
2) A line passes through $(2,10)$ and $(8,7)$. What is its slope?

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 $(4,5)$?

# <u>Plotting Points</u>

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 $(0, -8)$