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DATE: _____

GEOMETRY SUMMER ASSIGNMENT



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Summer Math Assignment:

The Passaic High School Mathematics Department requests all students to complete the summer assignment. Students must show work on white lined paper and return the assignment to their math teacher by Monday September 11, 2017. Assessment on the summer assignment will be administered the first week of school.

Thank you and have a great summer.

GEOMETRY SUMMER ASSIGNMENT**Order of Operations**

The order of operations is a set of guidelines that make it possible to be sure that two people will get the same result when evaluating an expression. You can use the acronym P.E.M.A. (**P**arentheses, **E**xponents, **M**ultiplication and **D**ivision, and **A**ddition and **S**ubtraction) to help you remember the order of operations.

Problem

How do you evaluate the expression $3 + 4 \times 2 - 10 \div 5$?

$$\begin{aligned} 3 + 8 - 10 \div 5 \\ = 3 + 8 - 2 \\ = 11 - 2 \\ = 9 \end{aligned}$$

There are no parentheses or exponents, so first, do any multiplication or division from left to right.

Do any addition or subtraction from left to right.

Evaluating Algebraic Expressions

What is the value of the expression for $x = 5$ and $y = 2$?

A $x^2 + x - 12 \div y^2$

$$x^2 + x - 12 \div y^2 = 5^2 + 5 - 12 \div 2^2 \quad \text{Substitute 5 for } x \text{ and 2 for } y.$$

$$= 25 + 5 - 12 \div 4 \quad \text{Simplify powers.}$$

$$= 25 + 5 - 3 \quad \text{Divide.}$$

$$= 27 \quad \text{Add and subtract from left to right.}$$

B $(xy)^2 \div (xy)$

$$(xy)^2 \div xy = (5 \cdot 2)^2 \div (5 \cdot 2) \quad \text{Substitute 5 for } x \text{ and 2 for } y.$$

$$= 10^2 \div 10 \quad \text{Multiply inside parentheses.}$$

$$= 100 \div 10 \quad \text{Simplify the power.}$$

$$= 10 \quad \text{Divide.}$$

Exercises

Simplify each expression.

1. $(5 + 3)^2$

2. $(8 - 5)(14 - 6)$

3. $(15 - 3) \div 4$

4. $\left(\frac{22+3}{5}\right)$

5. $40 - 15 \div 3$

6. $20 + 12 \div 2 - 5$

7. $(4^2 + 5^2)^2$

8. $4 \times 5 - 3^2 \times 2 \div 6$

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GEOMETRY SUMMER ASSIGNMENTEvaluate each expression when $s = -4$ and $t = 8$.

9. $(s + t)^3$

10. $s^4 + t^2 + s \div 2$

11. $(st)^2 \div (st^2)$

12. $(t - s)^5$

13. $(2s)^2t$

14. $2st^2 - s^2$

Distributive Property**Problem**

What is the simplified form of each expression?

a. $4(x + 5)$

$= 4(x) + 4(5)$ Distributive Property

$= 4x + 20$ Simplify.

b. $(2x - 3)(-3)$

$= 2x(-3) - 3(-3)$ Distributive Property

$= -6x + 9$ Simplify.

Exercises

Use the Distributive Property to simplify each expression.

1. $6(z + 4)$

2. $2(-2 - k)$

3. $(5x + 1)4$

4. $(7 - 11n)10$

5. $(3 - 8w)4.5$

6. $(4p + 5)2.6$

7. $-4(y + 4)$

8. $6(q - 2)$

Use the Distributive Property, then combine like terms to simplify each expression.

9. $3n + 3(1 + 8n)$

10. $-y + 4(y - 1)$

11. $-3(1 - 3x) + 2x$

12. $-2(-3k + 4) - 7$

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GEOMETRY SUMMER ASSIGNMENT**Solving One-Step Equations****Problem**What is the solution of $x + 5 = 33$?**Solve**

$$x + 5 = 33$$

$$x + 5 = 33$$

$$\quad -5 \quad -5$$

$$x = 28$$

Undo adding 5 by subtracting 5.

Simplify. This isolates x .**Check**

$$x + 5 = 33$$

$$28 + 5 \stackrel{?}{=} 33$$

$$33 = 33 \checkmark$$

Check your solution in the original equation.

Substitute 28 for x .**Exercises****Solve each equation using addition or subtraction. Check your answer.**

1. $-3 = n + 9$

2. $f + 6 = -6$

3. $m + 12 = 22$

4. $r + 2 = 7$

5. $b + 1.1 = -11$

6. $t + 9 = 4$

Define a variable and write an equation for each situation. Then solve.

- A student is taking a test. He has 37 questions left. If the test has 78 questions, how many questions has he finished?
- A friend bought a bouquet of flowers. The bouquet had nine daisies and some roses. There were a total of 15 flowers in the bouquet. How many roses were in the bouquet?

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GEOMETRY SUMMER ASSIGNMENT**Solve each equation using multiplication or division. Check your answer.**

9. $\frac{z}{8} = 2$

10. $-26 = \frac{c}{3}$

11. $\frac{g}{11} = -6$

12. $-\frac{a}{3} = 18$

13. $-25 = \frac{g}{5}$

14. $20.4 = \frac{s}{2.5}$

15. A student has been typing for 22 minutes and has typed a total of 1496 words. Write and solve an equation to determine the average number of words she can type per minute.

Solving Two-Step Equations**Problem**What is the solution of $5x - 8 = 32$?

$$\begin{array}{r} 5x - 8 = 32 \\ + 8 \quad + 8 \\ \hline \end{array}$$

$5x = 40$

$\frac{5x}{5} = \frac{40}{5}$

$x = 8$

To get the variable term alone on the left side, add 8 to each side.

Simplify.

Divide each side by 5 since x is being multiplied by 5 on the left side. This isolates x .

Simplify.

Check $5x - 8 = 32$

$5(8) - 8 = 32$

$32 = 32 \checkmark$

Check your solution in the original equation.

Substitute 8 for x .

Simplify.

Exercises**Solve each equation. Check your answer.**

1. $4f - 8 = 20$

2. $25 - 6b = 55$

3. $-z + 7 = -8$

4. $\frac{w}{-9} + 7 = 10$

5. $25 = 8 + \frac{r}{2}$

6. $\frac{y-8}{3} = -7$

GEOMETRY SUMMER ASSIGNMENT**Solve each equation. Justify each step.**

7. $6d - 5 = 31$

8. $\frac{p-7}{-2} = 5$

Define a variable and write an equation for each situation. Then solve.

9. Jerud weighs 15 pounds less than twice Kate's weight. How much does Kate weigh if Jerud weighs 205 pounds?
10. A phone company charges a flat fee of \$17 per month, which includes free local calling plus \$0.08 per minute for long distance calls. The Taylor's phone bill for the month is \$31.80. How many minutes of long distance calling did they use during the month?

Solving Multi-Step Equations**Problem**What is the solution of $-3y + 8 + 13y = -52$?

$$-3y + 13y + 8 = -52$$

Group the terms with y together so that the like terms are grouped together.

$$10y + 8 = -52$$

Add the coefficients to combine like terms.

$$\begin{array}{r} 10y + 8 = -52 \\ -8 \quad -8 \\ \hline 10y = -60 \end{array}$$

To get the variable term by itself on the left side, subtract 8 from each side.

$$10y = -60$$

Simplify.

$$\frac{10y}{10} = \frac{-60}{10}$$

Divide each side by 10 since y is being multiplied by 10 on the left side. This isolates y .

$$y = -6$$

Simplify.

ProblemWhat is the solution of $-2(3n - 4) = -10$?

$$26n + 8 = -10$$

Distribute the -2 into the parentheses by multiplying each term inside by -2 .

$$\begin{array}{r} -6n + 8 = -10 \\ -8 \quad -8 \\ \hline -6n = -18 \end{array}$$

To get the variable term by itself on the left side, subtract 8 from each side.

$$-6n = -18$$

Simplify.

$$\frac{-6n}{-6} = \frac{-18}{-6}$$

Divide each side by -6 since n is being multiplied by -6 on the left side. This isolates n .

$$n = 3$$

Simplify.

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GEOMETRY SUMMER ASSIGNMENT**Exercises**

Solve each equation. Check your answer.

1. $4 - 6k - 8k = 60$

2. $-32 = -7n - 12 + 3n$

3. $14 + 12 = -15x + 2x$

4. $8(-3d + 2) = 88$

5. $-22 = -(x - 4)$

6. $35 = -5(2k + 5)$

7. $3m + 6 - 2m = -22$

8. $4(3r + 2) - 3r = -10$

9. $-18 = 15 - 3(6t + 5)$

Solving Equations with Variables on Both Sides**Problem**What is the solution of $2m - 4 + 5m = 13 - 6m - 4$?

$$7m - 4 = -6m + 9$$

Add the terms with variables together on the left side and the constants on the right side to combine like terms.

$$\begin{array}{r} 7m - 4 = -6m + 9 \\ + 6m \quad + 6m \end{array}$$

To move the variables to the left side, add $6m$ to each side.

$$13m - 4 = 9$$

Simplify.

$$\begin{array}{r} 13m - 4 = 9 \\ + 4 \quad + 4 \end{array}$$

To get the variable term alone on the left, add 4 to each side.

$$13m = 13$$

Simplify.

$$\frac{13m}{13} = \frac{13}{13}$$

Divide each side by 13 since x is being multiplied by 13 on the left side. This isolates x .

$$m = 1$$

Simplify.

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Problem

What is the solution of $3(5x - 2) = -3(x + 6)$?

$$15x - 6 = -3x - 18$$

Distribute 3 on the left side and -3 on the right side into the parentheses by multiplying them by each term inside.

$$15x - 6 = -3x - 18$$

$$+ 6 \qquad + 6$$

To move all of the terms without a variable to the right side, add 6 to each side.

$$15x = -3x - 12$$

Simplify.

$$15x = -3x - 12$$

$$+ 3x \quad + 3x$$

To get the variable terms to the left side, add $3x$ to each side.

$$18x = -12$$

Simplify.

$$\frac{18x}{18} = \frac{-12}{18}$$

Divide each side by 18 since x is being multiplied by 18 on the left side. This isolates x .

$$x = -\frac{2}{3}$$

Simplify and reduce the fraction.

Exercises

Solve each equation. Check your answer.

1. $-5x + 9 = -3x + 1$

2. $14 + 7n = 14n + 28$

3. $22(g - 1) = 2g + 8$

4. $-d + 12 - 3d = 5d - 6$

5. $4(m - 2) = -2(3m + 3)$

6. $-(4y - 8) = 2(y + 4)$

7. $5a - 2(4a + 5) = 7a$

8. $11w + 2(3w - 1) = 15w$

9. $4(3 - 5p) = -5(3p + 3)$

Ratios, Rates, and Conversions

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Problem

Jared's car gets 26 mi per gal. What is his fuel efficiency in kilometers per liter? You need to convert miles to kilometers and gallons to liters. This will involve multiplying by two conversion factors.

There are 1.6 km in 1 mi. The conversion factor is either $\frac{1.6 \text{ km}}{1 \text{ mi}}$ or $\frac{1 \text{ mi}}{1.6 \text{ km}}$.

Since miles is in the numerator of the original quantity, use $\frac{1.6 \text{ km}}{1 \text{ mi}}$ as the conversion factor so that miles will cancel.

$$26 \frac{\cancel{\text{mi}}}{\text{gal}} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}}$$

There are 3.8 L in 1 gal. The conversion factor is either $\frac{3.8 \text{ L}}{1 \text{ gal}}$ or $\frac{1 \text{ gal}}{3.8 \text{ L}}$.

Since gallons is in the denominator of the original quantity, use $\frac{1 \text{ gal}}{3.8 \text{ L}}$ as the conversion factor so that gallons will cancel.

$$26 \frac{\cancel{\text{mi}}}{\cancel{\text{gal}}} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}} \times \frac{1 \cancel{\text{gal}}}{3.8 \text{ L}} = 10.9 \frac{\text{km}}{\text{L}}$$

Exercises

Convert the given amount to the given unit.

- | | | |
|----------------------|-----------------|----------------------|
| 1. 12 hours; minutes | 2. 1000 cm; km | 3. 45 ft.; yd. |
| 4. 32 cups; gallons | 5. 30 m; cm | 6. 15 lb.; kilograms |
| 7. 42 in.; cm | 8. 10 miles; km | 9. 25 ft.; in. |
10. Serrarode rode 15 mi in 1.5 hr. Phaelon rode 38 mi in 3.5 h. Justice rode 22 mi in 2.25 hr. Who had the fastest average speed?
11. Mr. Hintz purchased 12 gallons of drinking water for his family for \$14.28. He knows that this should last for 2 weeks. What is the average cost per day for drinking water for the family?
12. The price for a particular herb is 49 cents for 6 ounces. What is the price of the herb in dollars per pound?

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Solving Proportions

Problem

What is the solution of the proportion $\frac{4}{3} = \frac{8}{x}$?

$$\frac{4}{3} = \frac{8}{x}$$

$$4x = 3(8) \quad \text{Cross Products Property}$$

$$4x = 24 \quad \text{Multiply.}$$

$$x = 6 \quad \text{Divide each side by 4 and simplify.}$$

Problem

What is the solution of the proportion $\frac{b-8}{5} = \frac{b+3}{4}$?

$$\frac{b-8}{5} = \frac{b+3}{4}$$

$$4(b-8) = 5(b+3) \quad \text{Cross Products Property}$$

$$4b - 32 = 5b + 15 \quad \text{Distributive Property}$$

$$4b - 32 = 5b + 15 \quad \text{Subtract } 4b \text{ from each side.}$$

$$-4b \quad -4b$$

$$-32 = b + 15 \quad \text{Simplify.}$$

$$-47 = b \quad \text{Subtract 15 from each side and simplify.}$$

Exercises

Solve each proportion using the Cross Products Property.

1. $\frac{3}{5} = \frac{b}{8}$

2. $\frac{12}{m} = \frac{8}{3}$

3. $\frac{z}{2} = \frac{9}{6}$

4. $\frac{14}{v} = \frac{7}{3}$

5. $\frac{-4}{-9} = \frac{f}{-12}$

6. $\frac{13}{h} = \frac{2}{-6}$

7. A cookie recipe calls for a half cup of chocolate chips per 3 dozen cookies. How many cups of chocolate chips should be used for 10 dozen cookies?


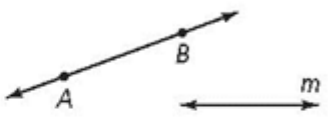


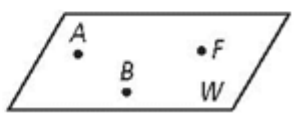
Solve each proportion using any method.

8. $\frac{x-3}{-2} = \frac{4}{5}$

9. $\frac{12}{10} = \frac{y+6}{13}$

10. $\frac{5}{x-3} = \frac{2}{-6}$

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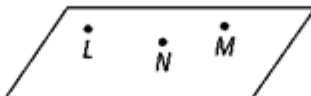
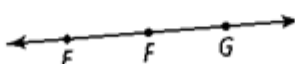

Introduction to Geometry: Points, Lines, and Planes		
Term	Examples of Labels	Diagram
Point	Italicized capital letter: D	
Line	Two capital letters with a line drawn over them: \overleftrightarrow{AB} or \overleftrightarrow{BA} One italicized lowercase letter: m	
Line Segment	Two capital letters (called endpoints) with a segment drawn over them: \overline{AB} or \overline{BA}	
Ray	Two capital letters with a ray symbol drawn over them: \overrightarrow{AB}	
Plane	Three capital letters (points): ABF , AFB , BAF , BFA , FAB , or FBA One capital letter (NOT a point): W	

Remember:

- When you name a ray, an arrowhead is not drawn over the beginning point. The arrowhead also **always** points to the right.
- When you name a plane with three points, choose no more than two collinear points.
- An arrow indicates the direction of a path that extends without end.
- A plane is represented by a parallelogram. However, the plane actually has no edges. It is flat and extends forever in all directions.

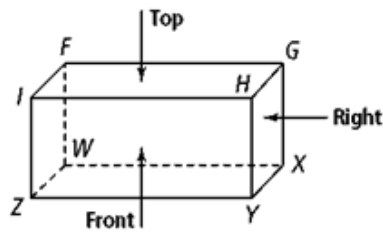
Exercises

Identify each figure as a *point*, *segment*, *ray*, *line*, or *plane*, and name each.

1. 2. 3. 4. 5. 6. 

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Identify the plane containing the given points as *front*, *back*, *left side*, *right side*, *top*, or *bottom*.

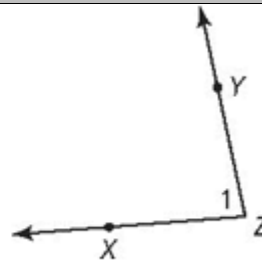
7. $F, G,$ and X 8. $F, G,$ and H 9. $H, I,$ and Z 10. $F, W,$ and X 11. $I, W,$ and Z 12. $Z, X,$ and Y 13. $H, G,$ and X 14. $W, Y,$ and Z

Introduction to Geometry: Angles

The *vertex* of an angle is the common endpoint of the rays that form the angle. In the diagram to the right, the vertex is point Z . An angle may be named by its vertex. It may also be named by a number or by a point on each ray and the vertex (in the middle).

This is $\angle Z$, $\angle XZY$, $\angle YZX$, or $\angle 1$.

It is *not* $\angle ZYX$, $\angle XYZ$, $\angle YXZ$, or $\angle ZXY$.



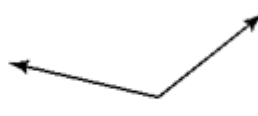
Angles are measured in *degrees*, and the measure of an angle is used to classify it.



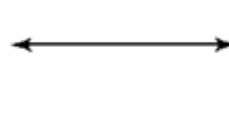
The measure of an *acute* angle is between 0 and 90.



The measure of a *right* angle is 90.



The measure of an *obtuse* angle is between 90 and 180.



The measure of a *straight* angle is 180.

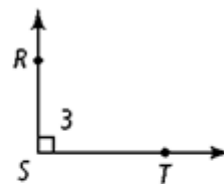
Exercises

Use the figure at the right for Exercises 1 and 2.

- What are three other names for $\angle S$?
- What type of angle is $\angle S$?
- Name the vertex of each angle.

a. $\angle LGH$

b. $\angle MBX$



Classify the following angles as *acute*, *right*, *obtuse*, or *straight*.

4. $m\angle LGH = 14$

5. $m\angle SRT = 114$

6. $m\angle SLI = 90$

7. $m\angle 1 = 139$

8. $m\angle L = 179$

9. $m\angle P = 73$