

# Moore Catholic High School

## Math Department

### Geometry Vocabulary

The following is a list of terms and properties which are necessary for success in a Geometry class. You will be tested on these terms during your first week of classes:

**abscissa** - The horizontal or  $x$ -coordinate of a two-dimensional coordinate system.

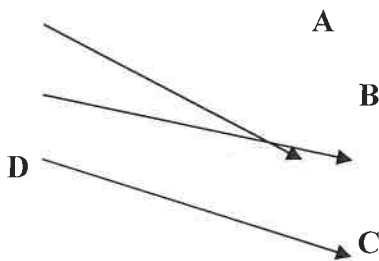
**absolute value** - The distance from 0 to a number  $n$  on a number line. The absolute value of a number  $n$  is indicated by  $|n|$ .

**Example:**  $|-3| = 3$ ,  $|+3| = 3$

**acute angle** - An angle whose measure is greater than  $0^\circ$  and less than  $90^\circ$ .

**acute triangle** - A triangle that contains three acute angles.

**adjacent angles** - Two coplanar angles that share a common vertex and a common side but have no common interior points.



$\angle ADB$  and  $\angle BDC$  are adjacent.  
They share a common vertex D and a common side  $\overline{DB}$ .

**alternate interior angles** - Any two nonadjacent angles that lie on opposite sides of a transversal and that are interior to the lines.

**altitude** - height of a geometric figure. It is drawn perpendicular to the base.

**angle** - A geometric figure formed by two rays that have a common endpoint.

**axis of symmetry** - A line that divides a plane figure into two congruent reflected halves; Any line through a figure such that a point on one side of the line is the same distance to the axis as its corresponding point on the other side.

**base** - Any side or face of a geometric figure to which an altitude is drawn.

**Cartesian coordinates** - An ordered pair of real numbers that establishes the location or address of a point in a coordinate plane using the distances from two perpendicular intersecting lines called the coordinate axes.

**chord** - A line segment joining any two points on a circle. The diameter is the largest chord of a circle.

**circle** - The set of all points (or locus of points) in a plane that are a fixed distance, (called the radius) from a fixed point, (called the center).

**circumference** - The length of or distance around a circle. The formula for circumference is:  
 $C = 2\pi r = \pi d$

**collinear points** - Points that lie on the same line.

**complementary angles** - Two angles the sum of whose measures is 90 degrees.

**congruent** - Having the same size and shape.

**coordinate plane** - The set of all points in a plane designated by their Cartesian coordinates (x, y). Also called the Cartesian plane.

**corresponding angles** - A set of angles formed on each of two or more lines cut by a transversal that are in the same position relative to each line and to the transversal.

**cube** - A 3-dimensional figure with six square faces.

**decagon** - A polygon with ten sides.

**diagonal** - A line segment that connects two non-consecutive vertices of a polygon.

**diameter** - A chord of the circle that passes through the center of the circle.

**endpoint** - A point at either the end of a line segment, or arc, or the initial point of a ray.

**equiangular** - A polygon with all interior angles congruent.

**equilateral polygon** - A polygon with all sides congruent.

**equilateral triangle** - A triangle with three congruent sides. Each angle is  $60^\circ$ .

**function** - A rule that assigns to each number  $x$  in the function's domain to a unique number  $f(x)$  in the range.

**geometry** - Branch of mathematics that deals with the properties, measurement, and relationships of points, lines, angles, surfaces, and solids.

**hexagon** - A polygon with six sides.

**hypotenuse** - The side of a right triangle opposite the right angle; the longest side of a right triangle.

**identity elements** - For a binary operation  $*$  and a set  $S$ ,  $I$  is the identity element if  $a * I = a$  and  $I * a = a$  for every element  $a$  that is in  $S$ .

**Examples:** (1) For addition (+) and the set of Integers, the number 0 is the identity element, because for every integer  $a$ :  $0 + a = a$  and  $a + 0 = a$ .

(2) For multiplication (x) and the set of Real Numbers, the number 1 is the identity element, because for every Real Number  $a$ :  $1 \times a = a$  and  $a \times 1 = a$ .

**interior** - The set of all points inside a geometric figure.

**intersecting lines** - Lines that share a common point.

**intersection of sets** - The intersection of two or more sets is the set of all elements that are common to all of the given sets.

**Example:** If  $A = \{1,2,3,6\}$  and  $B = \{0,2,5,6,7\}$ , then the intersection of A and B, denoted by  $A \cap B$ , is  $\{2,6\}$

**isosceles trapezoid** - A trapezoid in which the non-parallel sides are congruent.

**isosceles triangle** - A triangle that has at least two congruent sides.

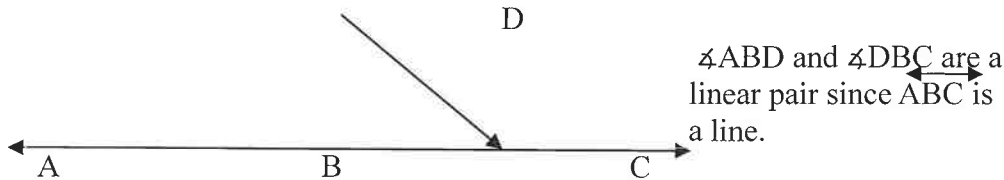
**line** - An infinite set of points.



**line segment** - Part of a line with two endpoints.



**linear pair of angles** - Any two adjacent angles whose non-common sides form a line.



**major arc** - In a circle, any arc whose length is greater than the length of a semicircle.

**minor arc** - In a circle, any arc whose length is less than the length of a semicircle.

**obtuse angle** - An angle whose measure is greater than 90 degrees and less than 180 degrees.

**obtuse triangle** - A triangle with one obtuse angle.

**octagon** - A polygon with 8 sides.

**opposite rays** - Two collinear rays whose intersection is exactly one point.



**ordered pair** - Two numbers that are used to identify the position of a point in a plane. The two numbers are called coordinates and are represented by  $(x, y)$ .

**ordinate** The vertical coordinate of a two-dimensional rectangular coordinate system; usually denoted by  $y$ .

**origin** The point in the Cartesian coordinate plane at which the horizontal and vertical axes intersect, designated by the ordered pair (0,0).

**parabola** - The graph of a quadratic function. It is two-dimensional and u-shaped. The equation of a parabola is in the form  $ax^2 + bx + c = 0$ .

**parallel lines** - Two or more coplanar lines that do not intersect.

**parallelogram** - A quadrilateral in which both pairs of opposite sides are parallel.

**pentagon** - A polygon with 5 sides.

**perimeter** - The sum of the lengths of all the sides of any polygon.

**perpendicular lines** - Two lines that intersect to form right angles.

**plane** - An undefined term in geometry usually visualized as a flat surface with no thickness that extends indefinitely in two dimensions.

**point** - An undefined term in geometry usually visualized as a dot which represents a location.

**point-slope equation of a line** - The equation of a line formed using its slope and the coordinates of a point on the line, where  $m$  is the slope of the line and  $(x_1, y_1)$  are the coordinates of the given point.  $y - y_1 = m(x - x_1)$

**polygon** A closed plane figure formed by three or more line segments that meet only at their endpoints.

**Pythagorean Theorem** - In a right triangle the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse; if  $a$  and  $b$  are the lengths of the legs and  $c$  is the length of the hypotenuse, then  $a^2 + b^2 = c^2$ .

**quadratic equation** - An equation that can be written in the form  $ax^2 + bx + c = 0$ , where  $a$ ,  $b$ , and  $c$  are real constants and  $a \neq 0$ .

**quadrilateral** - A polygon with 4 sides.

**radical** - The root of a quantity as indicated by the radical sign.

**radius** - A line segment drawn from the center of a circle to a point on the circle.

**ray** - Part of a line with one endpoint.



**rectangle** - A parallelogram containing one right angle; a quadrilateral with four right angles.

**regular polygon** - A polygon which is both equilateral and equiangular.

**rhombus** - A parallelogram with two adjacent congruent sides; a quadrilateral with four congruent sides.

**right angle** - An angle formed by two perpendicular lines, the measure of which is  $90^\circ$ .

**right triangle** - A triangle with one right angle.

**scalene triangle** - A triangle with no congruent sides.

**semi-circle** - Either of the arcs of a circle determined by the endpoints of a diameter. Half a circle.

**set** - A well-defined collection of items.

**slope** - The measure of the steepness of a line; the ratio of vertical change to horizontal change; if point P is  $(x_1, y_1)$  and point Q is  $(x_2, y_2)$  the slope of  $PQ = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

**slope - intercept equation of a line** The equation of a line formed using its slope and its y-intercept. If the coordinates of the y-intercept of the line are  $(0, b)$  and the slope is  $m$ , then the equation of the line is  $y = mx + b$ .

**square** - A rectangle with two congruent adjacent sides.

**supplementary angles** - Two angles the sum of whose measures is 180 degrees.

**surface area** - The sum of the areas of all the faces or curved surfaces of a solid figure.

**transversal** - A line that intersects two (or more) other lines.

**trapezoid** - A quadrilateral with exactly one pair of parallel sides.

**union of sets** - The union of two or more sets is the set of all elements contained in at least one of the sets.

**Example:** if Set  $A = \{2, 4, 6, 8, 10\}$  and Set  $B = \{1, 2, 3, 4, 5, 6\}$ , then the union of sets  $A$  and  $B$ , written as  $A \cup B$ , is  $\{1, 2, 3, 4, 5, 6, 8, 10\}$ .

**vertex of an angle** - The point of intersection of the two rays that form the sides of the angle.

**vertical angles** - The two nonadjacent angles formed when two lines intersect.

**volume** - A measure of the number of cubic units needed to fill the space inside a solid figure.

**x-axis** - The horizontal line used to establish the coordinates of points in the Cartesian plane; in that plane, the line whose equation is  $y = 0$ .

**x-coordinate** - The first coordinate in any  $(x, y)$  ordered pair; the number represents how many units the point is located to the left or right of the y-axis; also called abscissa.

**x-intercept** - The point at which the graph of a relation intercepts the  $x$ -axis. The ordered pair for this point has a value of  $y = 0$ .

**y-axis** - The vertical line used to establish the coordinates of points in the Cartesian plane; in that plane, the line whose equation is  $x = 0$ .

**y-coordinate** - The second coordinate in any  $(x,y)$  ordered pair; the number represents how many units the point is located above or below of the  $x$ -axis; also called ordinate.

**y-intercept** - The point at which a graph of a relation intercepts the  $y$ -axis. The ordered pair for this point has a value of  $x = 0$ .

## Properties of Mathematics

Commutative Property of Addition

$$a + b = b + a$$

Commutative Property of Multiplication

$$ab = ba$$

Associative Property of Addition

$$a + (b + c) = (a + b) + c$$

Associative Property of Multiplication

$$a \times (b \times c) = (a \times b) \times c$$

Identity Property of Addition

$$a + 0 = a$$

Identity Property of Multiplication

$$a \times 1 = a$$

Additive Inverse Property

$$a + -a = 0$$

Multiplicative Inverse Property

$$a \times \frac{1}{a} = 1$$

Distributive Property

$$a(b + c) = ab + ac$$

$$a(b - c) = ab - ac$$

Multiplication Property of Zero

$$a \times 0 = 0$$

# SUMMER ASSIGNMENT FOR COMMON CORE GEOMETRY 2018

This assignment is to be done on loose-leaf and all work is to be shown. It will be collected during your first math class at Moore Catholic High School. You will also be tested on this material during the first week of classes.

**Part I: Solve the following equations for the variable. Be sure to show all work.**

1.  $7 = 3x - 11$

4.  $18 + \frac{1}{2}x = -20$

2.  $6x + 3x - 4 = 86$

5.  $7x + 6 = 28 - x - 4$

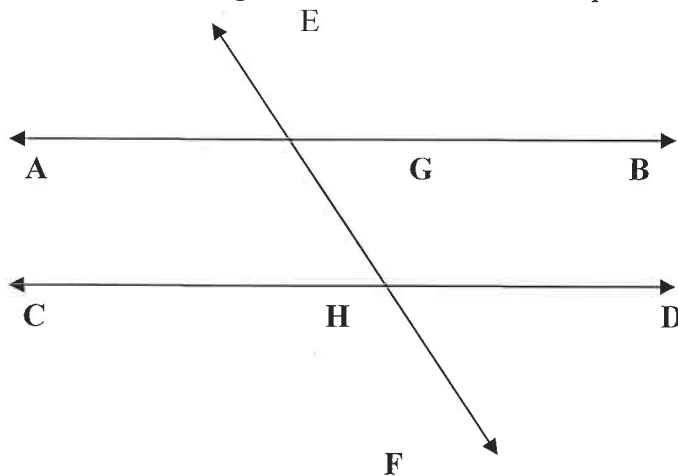
3.  $7(x + 2) = 6 + 3(2x - 1)$

6.  $\frac{x - 5}{10} = \frac{x + 4}{9}$

**Part II: Answer each of the following questions. Be sure to show all work including formulas, substitution into the formulas and solving procedures.**

1. If the legs of a right triangle are 3 and 4, express the length of the hypotenuse.

For questions 2 - 5, use the following diagram in which lines  $\overleftrightarrow{AB}$  and  $\overleftrightarrow{CD}$  are parallel and line  $\overleftrightarrow{EF}$  is a transversal which intersects the parallel lines at  $G$  and  $H$  respectively.



2. a) Name two pairs of alternate interior angles.  
b) Name two pairs of alternate exterior angles.  
c) Name four pairs of corresponding angles.  
d) Name two pairs of angles which are interior on the same side of the transversal.
3. If  $m\angle AGH = 68^\circ$ , find  $m\angle GHD$  and  $m\angle CHG$ .
4. If  $m\angle EGB = x + 10$  and  $m\angle GHD = 2x - 40$ , find  $m\angle EGB$ .

5. If  $m\angle CHF = 3x - 45$  and  $m\angle GHD = x + 17$ , find  $x$ .
6. In right triangle ABC,  $m\angle C = 90$  and  $m\angle A = 43$ . What is  $m\angle B$ ?
7. In an isosceles triangle, a base angle contains  $32^\circ$ . What is the measure of the vertex angle?
8. If two angles are complementary and one angle is 6 more than twice the other, find the measures of both angles.
9. Angle A and B are supplementary. If  $m\angle A = 7y - 2$  and  $m\angle B = 2y + 17$
10. Three angles of a triangle are in a ratio of 3:5:10 Find all three angles.

**Part III: Write each of the following in simplest radical form.**

1.  $\sqrt{20}$
2.  $\sqrt{18}$
3.  $8\sqrt{72}$
4.  $\frac{1}{2}\sqrt{500}$
5.  $7\sqrt{32}$
6.  $\sqrt{18} - \sqrt{50} + 11\sqrt{200}$
7.  $\sqrt{121} - \sqrt{36}$

**Part IV: Write the equation of each line based on the given information. Remember  $m = \text{slope}$  and  $b = \text{y-intercept}$ .**

1.  $m = 4$  and  $b = -7$
2.  $m = \frac{1}{2}$ , contains the point  $(4, -6)$
3.  $m = 0$ , contains the point  $(5, 7)$
4.  $m$  is undefined, contains the point  $(-4, -1)$
5. contains the points  $(3, 8)$  and  $(6, 2)$
6. contains the points  $(5, -5)$  and  $(1, -7)$

**Part V: Answer the following questions. Be sure to write any formulas that you used and show all work.**

1. Find in terms of  $\pi$  the area of a circle with diameter 14 m.
2. Find the perimeter of a square where one side measures 10 inches.
3. If the perimeter of a square is 20 inches, find the area of the square
4. If the base of a parallelogram is 3 centimeters and the height is 12 centimeters, find the area of the parallelogram.



5. If the area of a triangle is 40 square centimeters and the base is 4 centimeters find the height of the triangle.
6. Find the volume of a sphere to the nearest tenth that has a diameter of 12 inches.
7. Find the volume of a cone that has a diameter of 6 inches and height of 2 inches.
8. In triangle ABC the  $m\angle A = 62$  degrees and the measure of  $\angle C = 33$  degrees. Name the sides in descending order.

**PART VI: Factor the following completely.**

1.  $x^2 - 5x + 6$
2.  $12x + 27$
3.  $x^2 - 121$
4.  $3x^2 + 12x + 12$
5.  $x^2 - 11x + 30$
6.  $19x^3 - 19x$
7.  $40ax - 10x$
8.  $5x^2 - 25x + 30$
9.  $121 - m^2$
10.  $x^3 + 3x^2 - 18x$
11.  $a^2 + 2a - 80$
12.  $7a^4b^2 - 28a^2b^2$
13.  $y^2 + 5y + 6$
14.  $x^4 - 81$
15.  $x^3 - 2x^2 - 4x + 8$

