

Geometry – Vocabulary Chapter 1

STOP: Vocabulary and Notation is VERY important in Math—you MUST learn and be able to use both. Hint: know how to spell

1—1

Cartesian plane → name given to the plane containing points identified as ordered pairs of real (\mathbb{R}) numbers. Named after Rene Descartes. Also called the *coordinate plane* and the study of points as ordered pairs is called *plane coordinate geometry*.

Quadrants: regions of the coordinate plane ----- Origin: pt at the intersection of the x-axis and the y-axis.

Ordered pair → A pair of numbers (a, b) identifying a point in a two-dimensional coordinate system/plane. (Horizontal, Vertical) → (x, y)

coordinate → number paired with each point on a number line or one number of an ordered pair in a coordinate system.

x-axis → The line in the coordinate plane, usually horizontal, containing those points whose second coordinates are **0**.

y-axis → The line in the coordinate plane, usually vertical, containing those points whose first coordinates are **0**.

Collinear → pts are collinear if they lie on the same line.
If pts lie on the same line, are they collinear?

Noncollinear → pts that do not lie on the same line

1—2

Euclidean geometry → Euclid developed a pattern of reasoning using postulates and axioms which became known as Euclidean geometry. He wrote the book, Elements, 2300 years ago and it is still used today because it is so clear and simple.

There are 3 basic undefined terms in geometry.

Descriptions:

1. **POINT** → (0 dimension) no size, no dimension, only position

Notation: usually a capital letter A, S, X, etc.

2. **LINE** → (1 dimension) infinitely many points extending w/o end in both directions

Notation: usually a lower case letter s, t, u, etc.

or 2 capital letters w/a line on top

\overline{AB} , \overline{XY}

3. **PLANE** → (2 dimensions) flat surface w/no thickness that extends w/o end in all directions

Notation: usually named by a capital letter, sometimes lower case, sometimes by 3 capital letters. A, a, ABC

coplanar → pts that lie in the same plane.

noncoplanar → pts that do not lie in the same plane.

These 3 undefined terms will be used in the definitions of other terms.

Set → a group of objects that have something in common.

Space → (3 dimensions) is the **set** of all points.

figure → a finite set of points

intersection → set of points that lie in two figures. (a line is a figure)

half-plane → If a line separates a plane into 2 sets (each w/infinately many pts), each set is called a half-plane.

edge → the line that separates a plane into half-planes is called the edge of each half-plane, but is not contained in either half-plane.

1—3

Area of a Rectangle → $A(\text{rect}) = \text{length} \cdot \text{width}$

Perimeter of any figure → sum of the all the sides.

Perimeter of a rectangle: $P(\text{rect}) = 2 \cdot \text{length} + 2 \cdot \text{width}$

1—4

between → a point is between two points if all the pts are collinear and the pt lies on the segment contained by the two pts.

Number Line → A line on which points are identified with real numbers.

Distance/measure → in Euclidean geometry, always the shortest path from one object to another.

notation: AB, BA, XY, ST Note: **not a set of points**—is a positive real number

Number Line: distance between two points on a number line is the absolute value of the difference of their coordinates.

Distance = $|A - B|$ or $|B - A|$ where A and B are points on the

number line. **IMP:** A and B do not represent the points A and B but the coordinates of A and B.

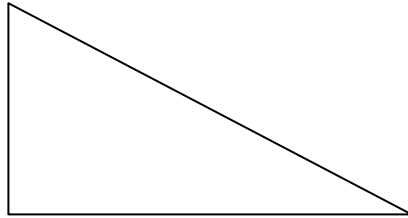
Coordinate Plane: distance between two points in a plane is:

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

postulate → a statement assumed to be true – axiom.

Theorem → A statement proved (deduced) to be true from postulates, definitions, or other previously proved theorems.

Pythagorean Theorem:
Right Triangle →



In a right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse.

$$Hyp^2 = leg1^2 + leg2^2$$

segment → Set of points consisting of the endpoints and all points between the endpoints.

Notation: \overline{AB} , \overline{XY}

ray → Set of all points on a line that consists of a segment, \overline{AB} , and all points C such that B is between C and A.

Notation: \overrightarrow{AB} , \overrightarrow{AC} **IMP:** note that the first label of the ray is the endpoint .

opposite rays → rays are opposite if the set of points of both rays are collinear and the rays have a common endpoint.

Midpoint → Point that divides a segment into two equal segments (two congruent segments).

Congruent → same shape, same size

slope → the change in y-values divided by the corresponding changes in x-values.
(also: rate of change or ratio)

$$\text{slope} = m = \frac{\Delta y}{\Delta x} = \frac{y_1 - y_2}{x_1 - x_2} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$$

Equation of a Line → a statement that shows that two expressions are equal and that statement can be evaluated graphically as a straight line.

Standard Form: $Ax + By = C$

Slope-intercept Form: $y = mx + b$

Vertical line → Line that has no slope.

$x = n$, (n represents any number)

$Ax + 0y = C$

Horizontal line → Line that has 0 slope.

$y = n$ (n represents any number)

$0x + By = C$

Oblique line → Line that has a positive or negative slope.

$y = mx + b$

$Ax + By = C$

Parallel Lines (//) → two coplanar lines that have no points in common or are identical.

Slopes of parallel Lines are equal (the same).

Perpendicular Lines (⊥) → two lines that have one point in common and intersect to form right angles.

Slopes of perpendicular lines are negative reciprocals of each other