Geometry

Index

- **Geometry—Chap 1.1**

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

Coordinate Plane → (also called Cartesian plane) Name given to a plane for which two perpendicular number lines intersect at their zero points. Each point in the coordinate plane can be referred to/located by its ordered pair.

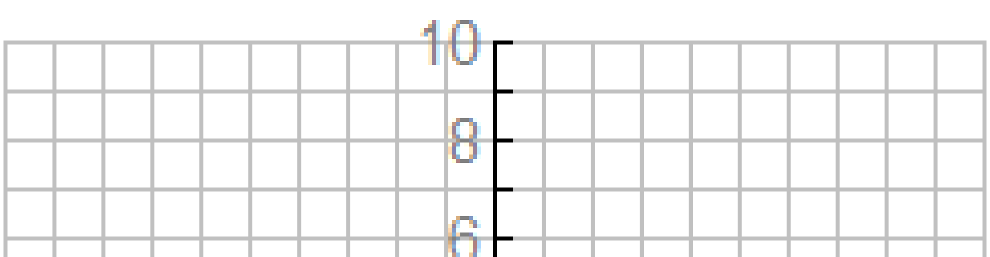
Ordered pair → used to locate points in a coordinate plane.

Notation:

(horizontal coordinate, vertical coordinate)

** IMP: Parentheses must be used **

examples: (x, y); (5, 3): (s, t)



P(2, -5); Q(-3, 0); R(1, 6)

x-axis → name that is usually given to the horizontal number line in the coordinate plane.

y-axis → name that is usually given to the vertical number line in the coordinate plane.

origin → point of intersection of the two number lines.

Ordered pair notation: (0, 0) for that point.

Quadrants → One of the four regions into which the two perpendicular axes of a coordinate plane divide the plane Quadrants are numbered I to IV starting with the upper right quadrant moving counterclockwise.

Remember that you may plot an equation on the coordinate plane. One way was using a Table of Values.

Equation: y = 2x - 1		
X	Y	(x, y)
-2	-5	A(-2, -5)
-1	-3	B(-1, -3
0	-1	C(0, -1)
2	3	D(2, 3)

Another way is using the equation itself. Remember!!!!! Slope / intercept form

Then----Connect the dots ☺

Collinear→All points lie on the same line

Noncollinear→not all the points lie on the same line

Coming Next!!!!!!

- **Points**
- **Lines**
- **Planes**
- **Space**

Geometry—Chapter 1-2

Euclid—Father of Geometry
13 Books on Geometry

Started out with some Undefined Terms—because they have only been explained using examples and descriptions

Points→0 dimensions
    Notation: Capital letter ex: A, B, P

Lines→1 dimension
    Notation: $\overleftrightarrow{AB}$, $\overleftrightarrow{XY}$, etc or
    lowercase letter p, l, etc

Planes→2 dimensions
    Notation: Plane ABC, Plane XYZ or
    just a Capital letter ex: P

Space→3 dimensions

4 Dimensions???????

Intersection→where the two figures have points in common.

Coplanar→points all lie in the same plane

SPACE-the final Frontier

Geometry—Chapter 1-3

Two important formulas:

Area of a rectangle

$A(rect) = (length)(width) = l(w)$

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

$p(rect) = 2\ (length) + 2\ (width) = 2\ l + 2\ w$

Finding the maximum area by graphing----- Construct a table of values using the above formula (see page 21)

Could we use the calculator for this????

Geometry—Chapter 1-4

Measuring Segments

Wait!!! What is a segment????

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

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

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.

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

Notation: $\overrightarrow{AB}, \quad \overrightarrow{AC}$

IMP: note that the first label of the ray is the endpoint .

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.

→ **Distance** between two points in the Coordinate Plane is

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

where (x_1, y_1) and (x_2, y_2) represent the two points.

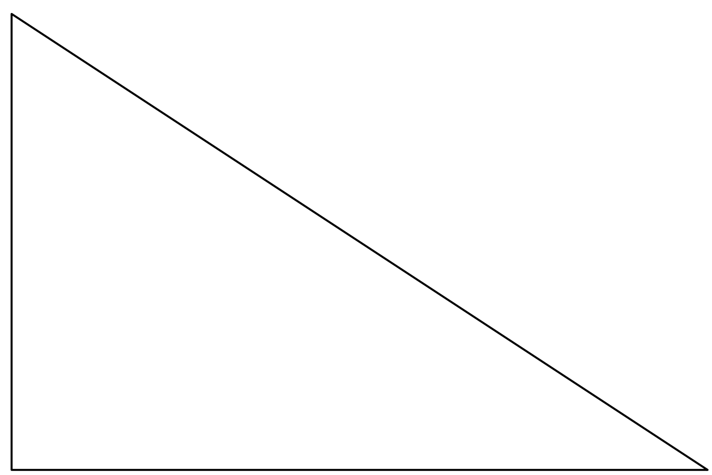
Euclid stated his Geometry using a logical method.   He defined and used Postulates and Theorems.

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:

<u>Right Triangle</u>



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

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

Geometry—Chapter 1-5

Midpoints & Segment Congruence

Congruent → same shape, same size

Notation: $\cong$ ex: $\overline{AD} \cong \overline{ST}$

If segments are congruent then the measure/length/distance of the segments are equal. $AD = ST$

The Midpoint is a <u>precise</u> point in a segment.

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

Midpoint Theorem→If M is the midpoint of $\overline{AB}$, then $\overline{AM} \cong \overline{MB}$.

Midpoint Formula→for the:

- Number Line:

$$midpt = \frac{A+B}{2}$$

- Coordinate System(Plane):

$$Midpt = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\begin{cases} Midpt \ \left(x - coordinate \right) = \left(\dfrac{x_1 + x_2}{2} \right) \\ Midpt \ \left(y - coordinate \right) = \left(\dfrac{y_1 + y_2}{2} \right) \end{cases}$$

Segment Bisector→can be a point, line, ray, plane, or another segment that divides a segment into 2 congruent segments (into 2 equal lengths).

Geometry—Chapter 1-6

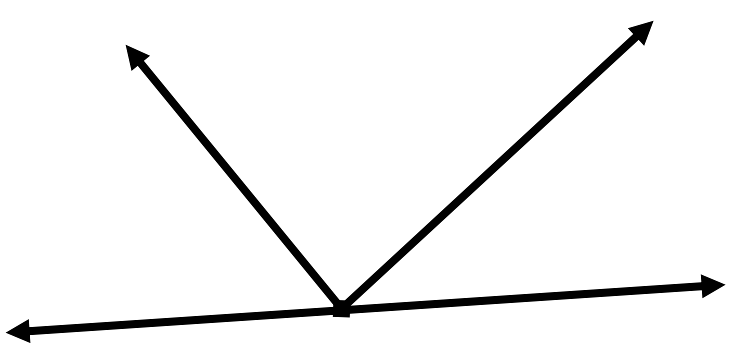
Exploring Angles

Angle→is determined by two rays (**<u>Sides</u>** of the angle) intersecting at their common endpoint called the **<u>vertex</u>** of the angle.

Notation: $\angle$ *or* $\measuredangle$ *or* ∢ followed by the label for the angle—which may only be 3 Capital letters, 1 capital letter, or a number.

Ex:

The Word-------- AMBIGUITY (being ambiguous) ☺



slope → the change in y-values divided by the corresponding changes in x-values.

(also: rate of change or ratio)

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

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: $y = mx + b$

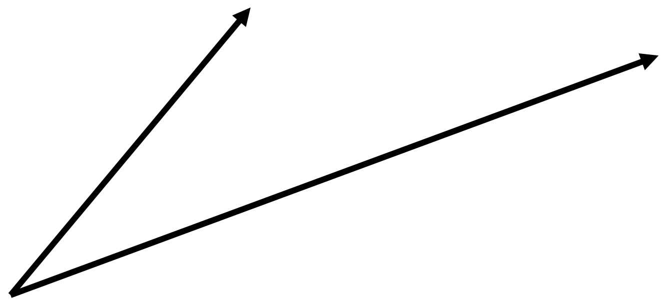
Vertical line → Line that has no slope.

x = n, (n represents any number)

Ax + 0y = C

Opposite Rays→rays that meet only at their endpoints and all points are collinear.

Interior and Exterior of an angle-------



Angles are measured in <u>degrees.</u>

Notation: $m\measuredangle B = 78^\circ$ developed from the circle

Protractor→device that measures the degree of an angle. Also may be used to determine the degree of an angle.

Segment Addition Postulate

Angle Addition Postulate

One way that Angles may be **<u>Classified</u>** is by their measures……..

- Right Angle- $m\measuredangle = 90^{\circ}$

- Acute Angle- $90^{\circ} < m\measuredangle < 0^{\circ}$

- Obtuse Angle- $90^{\circ} < m\measuredangle < 180^{\circ}$

- Straight Angle- $m\measuredangle = 180^\circ$

What does congruent angles mean?????

Last but not least-----**Angle Bisector**

Geometry—Chapter 1-7

Angle Relationships

Special Pairs of angles formed by 2 rays

- **Adjacent angles—**angles that have the same vertex and share a side but <u>no</u> interior points.

- **Vertical angles—**2 non-adjacent angles formed by two intersecting lines.

- **Linear pair—**2 adjacent angles whose non-common sides are opposite rays

Perpendicular Lines are intersecting lines that form right angles.

Perpendicular lines* intersect to form **4 right angles.

IMPORTANT!!!!!! STOP!!!!!!!!!
BELLS are RINGING!!!!!

Thm: Vertical angles are congruent.

Thm: The sum of the measures of the angles in a linear pair is 180°.

Def: **Supplementary Angles** are 2 angles whose measures have a sum of **180**° .

Def: **Complementary angles** are 2 angles whose measures have a sum of **90**°

Ex: The measure of the supplement of an angle is 60 less than three times the measure of the complement of the angles. Find the measure of the angle.

Set-Up: let x = measure of angle

Supple is 60 less than 3 times the comple

$180 - x = 3(90 - x) - 60$

☼--**The end**