**Math 2 Geometry**
Based on *Elementary Geometry, 3rd ed*, by Alexander & Koeberlein

1.3
Early Definitions and Postulates

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**Four Parts of a Mathematical System**

1. Undefined terms • vocabulary
2. Defined terms • vocabulary
3. Axioms or postulates • principles
4. Theorems • principles

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**“Good” Definition**

Definition: An isosceles triangle is a triangle that has two congruent sides.

1. It names the term being defined.
2. It places the term into a set or category.
3. It distinguishes the term from other terms without providing unnecessary facts.
4. It is reversible.

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**Definition**

• A line segment is the part of a line that consists of two points, known as **endpoints**, and all points between them.

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**Postulate 1**

Through two distinct points, there is exactly one line.

• Alternate wording: Two points determine a line.

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**Postulate 2 “Ruler Postulate”**

The measurement of any line segment is a unique positive number.

• “Unique” implies: There exists a number measurement for each line segment and only one measure is permissible.
Definition
The distance between two points A and B is the length of the line segment AB that joins the two points.

• This is related to the statement: “The shortest distance between two points is a straight line.”

Postulate 3
Segment-Addition Postulate
If X is a point of segment AB and A-X-B, then AX + XB = AB

Definition
Congruent segments are two segments that have the same length.

• seg AB ≅ seg CD if and only if AB = CD

• Recall informal definition of congruent: same size and shape.

Informal Definitions
If A, M, and B are collinear and seg AM ≅ seg MB

Then:
• M is the midpoint of seg AB
• Seg CD is a bisector of seg AB

Definition
Ray AB, is the union of seg AB and all points X on line AB such that B is between A and X.

Union (informal): the joining or combining of two figures or sets of points.

Symbol for ray AB:
Definition

**Parallel lines** are lines that lie in the same plane but do not intersect.

Lines that are not in the same plane and do not intersect are called **skew lines**.

Postulate 5

Through three noncollinear points, there is exactly one plane.

Alternate wording: Three noncollinear points determine a plane.

Postulate 6

If two distinct planes intersect, then their intersection is a line.

Informal definition: If two planes do not intersect, they are parallel.

Postulate 7

Given two distinct points in a plane, the line containing the points also lies in the plane.

Theorem 1.3.1

The midpoint of a line segment is unique.