

§1.1 Measurement Problems

Our course will deal with two basic topics: measurement and data, and geometry. These correspond exactly to two of the domains in the Common Core State Standards.

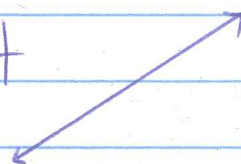
- Measurement begins in kindergarten by measuring lengths and weights and comparing them (longer/shorter, heavier/lighter etc.), and by counting the number of objects in different categories.
- Geometry begins in kindergarten by identifying shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)

Some geometry definitions and notation.

A plane is a flat surface without any edges.

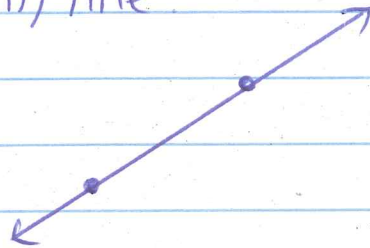
A point is a location

A line is a path that does not curve. It extends in both directions and has no endpoints.

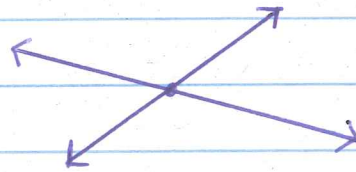


Basic Principles of Geometry

1. Through any two different points there is exactly 1 (straight) line

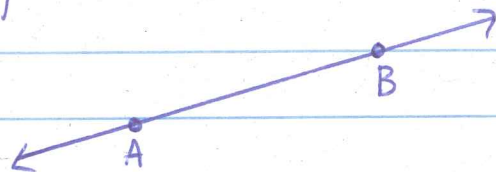


2. If two different lines intersect then their intersection is a single point

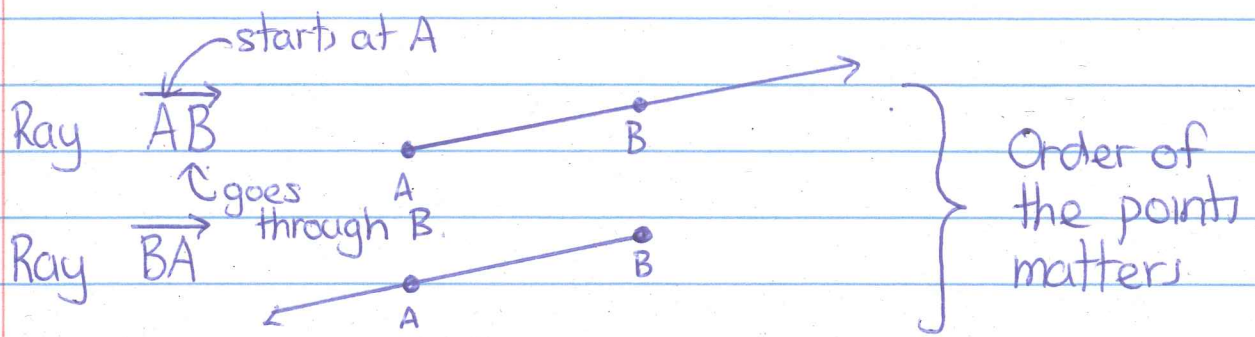


As a consequence of 1) we may specify a line by giving 2 points that lie on it. Points are normally drawn as dots and are labeled by capital letters

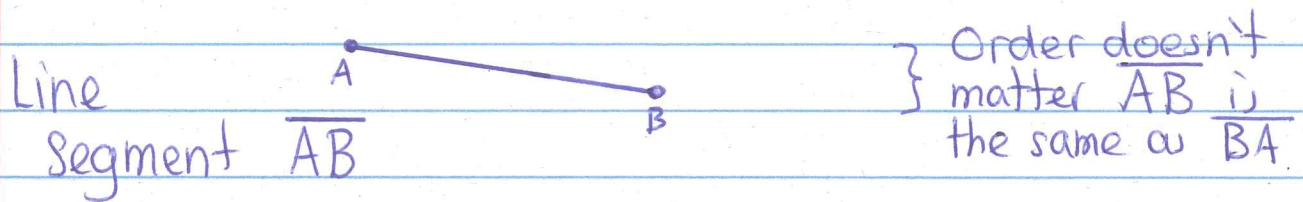
Line \overleftrightarrow{AB}



A ray is the portion of a line on one-side of a point.



A line segment, sometimes just segment, is the portion of a line between two points

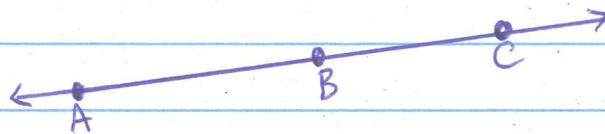


Two distinct points determine

1 line, 1 line segment, 2 rays

Three distinct points either

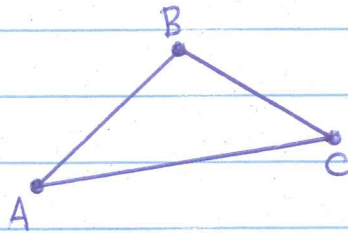
1. lie on the same line



In this case we say A, B, and C are collinear points

2. Determine 3 different line segments (\overline{AB} , \overline{BC} , and \overline{AC}) that together form a

triangle.



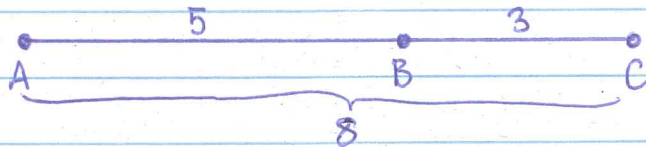
A straightedge is any straight object that can be used to draw line segments. A straightedge is NOT used to measure lengths. A straight edge is a "ruler without markings".

Length in Geometry

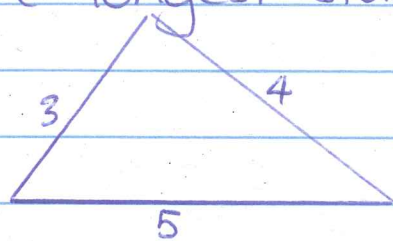
We will denote the length of \overline{AB} by AB . Two line segments are called congruent if they have the same length.

There are two obvious but important facts

i.) length along a line add



2) In any triangle the length of the longest side is less than the sum of the lengths of the other two sides



$$5 < 3 + 4$$

In a combined form these are called the triangle inequality

For any 3 points A, B, and C the distances between them satisfy

$$AC \leq AB + BC$$

and equality occurs if and only if A, B, and C are collinear with B between A and C