10/27/2012
CTTI Geometry workshop notes

Intro Discussion
Review problem from assignment
-(Rusty Compass) "N-sect" a line segment

Motivating idea: Why does this construction work?
-What axioms do we need?
-Are Euclid's enough?
-Others?
-What does consideration of the axioms mean for our classroom?

4points & patted/lined paper Activity
- "N-sect" a given line with only 4 points and lined paper

Intersecting Circles activity
-How do we ensure that Euclid's circles intersect?
-See Axioms 3' & 3'' in text
-Do these work for all cases?

Triangle Congruence
-Do our conventions for naming geometric capture a sufficient amount of information to identify those objects?
-Does the inclusion of more specific information in names imply more stringent requirements for figure congruence?

Proving SSS
-Why couldn't/didn't Euclid prove it?
-Is having the concept of angle measure equivalent to SSS? I.e., would Euclid have proved SSS if he had used angle measure? Does this even matter?

-Discussion of how to define right angles (as a bisected straight angle)
-construction of right angle activity

-But how can you prove that right angles constructed in different places are congruent?

Prove angles of equilateral triangle are 1/3 of a straight angle
-(half-hexagon construction)
-How do you know that the 3 angles add up to a straight angle? (can't tell by just looking)
-Because we know what it's "supposed" to be, that influences our "reasoning".
-Need Parallel postulate to prove

Back to motivating problem: "N-section"
-Brainstorm what you need to use
-Similar triangles
-What is involved in similarity?: congruence of angles, parallel lines
-Scale factor: Dilations
-ratios

Proof of Exterior Angle Theorem
-What do we need?

Alternate interior angles-Congruence
-Equivalence to parallel postulate.

-questions about the relationship of lines/planes and the concept of unique parallel lines.
    -Difference between saying there is a unique line drawn through two points (2D), and saying that there are an infinite number of planes that intersect a given line(3D).

-question about whether we need to use algebra to prove geometric theorems
    -Do we have to use numbers? Should we, or should we stick to non-numerically-based proofs? What if some students find working with numbers to be easier?
    -Benefits of multiple approaches/perspectives. Pedagogical usefulness of grappling with difficulties.

-Various definitions of parallel: constant perpendicular distance; alternate interior angle congruence; don't intersect. More?

-Parallel lines, rigid translations/rotations, and alternate interior angle congruence

Parallelograms-Brief intro