**High School: Geometry Learning Progression for edTPA**

Common Core State Standards

CCSS.MATH.CONTENT.HSG.CO.A:

Know precise definitions of angle,
circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

CCSS.MATH.CONTENT.HSG.CO.A.3

Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself

CCSS.MATH.CONTENT.HSG.CO.C.9

Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.

CCSS.MATH.CONTENT.HSG.CO.C.11:

Prove theorems about parallelograms. Theorems include: Opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, and rectangles are parallelograms with congruent diagonals.

The setting for this learning progression is a high school geometry classroom. The classroom doesn’t have any students with disabilities, but it does have 2 ELL students. I will need to accommodate them in way that helps them individually. They will be given copies of the notes before each lesson so they’re able to follow along. Any vocabulary on these notes will be translated into Spanish for them to fully understand the meaning. I will also check with them individually to make sure they are understanding everything.

The textbook used for this class is *Geometry* by Boswell, Larson, and Stiff, published in 2001 by McDougal Littell. The unit is 6.3 and 6.4. Before this unit, students learned about proofs on angles, side lengths, and properties of parallelograms.

**Lesson 1: Rectangles and Rhombuses:** For the first lesson, students will have new material in the form of properties. All students should know what a rectangle is and most students should know what a rhombus is. The purpose of this lesson is to explain the properties of rectangles and rhombuses, how to find their angles, and how to find their sides (with appropriate given information). The common core standard that aligns with this lesson is HSG.CO.C.11. While the lesson isn’t about proofs, some of the problems require students to “informally” prove or use theorems about angle measurements or side lengths.

For this lesson, I will use an approach that engages the students through active participation. In general, I will ask the students to perform a task on their own (they will be allowed to collaborate with other students) and then come back together to discuss the task. This approach uses MP1 and MP3 because the students must think about what the answer to the task will be and use reason to solve it. Also, students should compare answers with their peers and argue who is correct and incorrect.

To start out the lesson, I will ask all the students to draw a rectangle on their notes, an easy enough task. Afterwards, I will ask the class what they drew, which sides are parallel, which sides are congruent, and which angles are congruent. Students should say that opposite sides are congruent and parallel, and all angles are congruent (on top of having a quadrilateral). This task exemplifies higher understanding of the shape and why it is what it is. After this task, the students will be asked about properties of the diagonals of rectangles. They will draw the diagonals out on their rectangles and write what properties they have. I will then ask what everyone wrote down. They should have gotten that both diagonals are congruent and that they bisect each other. It is likely that most students will not get both of these, so a diagram will be drawn on the board and explained through that.

MP1: Make sense of problems and persevere in solving them

MP2: Reason abstractly and quantitatively

MP3: Construct viable arguments and critique the reasoning of others

MP5: Use appropriate tools strategically

The next portion of lesson 1 focuses on rhombuses. I will take a similar approach to the rectangle for this, in beginning by asking the students to draw a rhombus on their notes, and asking what the properties are. They should get that all sides are congruent, opposite sides are parallel, and opposite angles are parallel. This is expected to be much more difficult than the previous rectangle because students aren’t as accustomed to working with rhombuses as they are for rectangles. After they have inconsistent answers for a rhombus, I will explain through a diagram the properties of a rhombus. After this, I will do the diagonals similarly to those of a rectangle and ask what the students think they are. I expect this to be maybe more successful than before since they will know the different properties of both figures and can see them in comparison. Students will likely struggle a bit, but hopefully come up with the diagonals of a rhombus to be perpendicular and bisect the angles.

The assessment for this lesson is a worksheet which has problems with angle measurements, side lengths, and identifying figures. This worksheet requires higher order thinking because there are some abstract problems (like creating right triangles with the diagonals of rhombuses).

**Lesson 2: Trapezoids and Kites:** This lesson will be in almost the exact same format as above. The only change besides the specific figures is that trapezoids have a midsegment, which is specific to that figure. There is also some different vocabulary that will be explained.

Trapezoids are to be started out with. I’ll begin the same with starting the students out by having them attempt to draw a trapezoid on their paper. I think this should be mostly successful as long as they talk with each other and compare figures. I will discuss what makes a trapezoid a trapezoid, *one* pair of congruent sides. After this, I will explain the base, legs, and height of a trapezoid and the special characteristics of an isosceles trapezoid (legs are congruent).

I will continue using this strategy for kites. After this lesson, the students will receive a worksheet similar to before, which requires higher order thinking and problem solving. These two lessons reflect the mathematical practices because the students must use them for the problems.

MP1: Students will run into difficult problems, even possibly not knowing how to do them, but with proper discourse and collaboration they will get through them.

MP2: Some problems require abstract thinking and previous knowledge of geometry (like applying The Pythagorean Theorem).

MP3: Students are encouraged to work together and to discuss with each other, possibly argue, about the correct approach to a problem.

MP5: The tools students are expected to use are formulas given to them, like the mid-segment formula, at the right problems.

Links to worksheets: Day 1
<http://www.bakermath.org/Classes/Geometry/Chapter%206/6-4%20WB.pdf>

Day 2: <http://www.campbell.k12.ky.us/userfiles/1053/Classes/8232/Geometry%20Trapezoid%20and%20Kite%20Worksheet.pdf>