

Name: Christopher Coleman	Program: Student Teaching	Course: Geometry
Lesson Topic/Title: Introduction to proofs and writing proofs		
Lesson Date: 09/05, 09/07, 09/09	Lesson Length: 90 minutes	Grade/Age: Grade 8/ 13-14
<p>Learning Objectives (Targets):</p> <ul style="list-style-type: none"> • Understand the different types of proof (picture -> t-table -> written) • Able to correctly identify Algebraic properties • Will be able to correctly write a proof • Will be able to prove statements regarding angle-pair relations, segments, and algebraic properties. • Students will become more proficient in Geogebra and learn how to apply it to their current content. 		
<p>Standards: CCSS.MATH.CONTENT.HSG.CO.C.9 Prove theorems about lines and angles.</p> <p>CCSS.MATH.CONTENT.HSG.CO.C.10 Prove theorems about triangles.</p> <p>CCSS.MATH.CONTENT.HSG.CO.C.11 Prove theorems about parallelograms.</p> <p>CCSS.MATH.CONTENT.HSG.CO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).</p> <p>Teaching Standards:</p> <ul style="list-style-type: none"> • <i>Assessment</i> • <i>Instructional Strategies</i> • <i>Learning Differences</i> • <i>Learner Development</i> 	<p>Standards Alignment & Justification:</p> <p>I have met these common core standards by providing pre-requisite skills for these students when it comes to proofs. Proving theorems is a year-long experience in geometry, but we will begin to lay the groundwork in this lesson and students will understand proofs not only in the high school geometry sense, but in regards to actual mathematics.</p> <p>In addition, we will make formal geometric constructions using Geogebra. This is applying Technology at a high SAMR level, where they will learn to create something and share it digitally with me through a shared google drive folder.</p> <p>As for the teaching standards, a big portion of this geometry class is adapting to the ELL learners. Proofs are a heavily motivated English concept, with complete sentences and</p>	

	<p>writing to complete a point. Many of these students struggle with their English as is, so I have met many of these teaching standards by modifying the lessons to accommodate all of the learner needs. Proven especially by my modified exams and quizzes for select students who really need the extra assistance in understanding the material. It's a difficult topic to balance, but I believe through this modification and my instructional strategies I have met these standards while at the same time not giving up any of the rigor of the content that is required in this chapter.</p>
<p>Assessment: ⊖ Pre ⊖ Formative ⊖ Summative ⊖ Student Self</p> <p>Pre: Crossword Puzzle Formative: Geogebra Assignment Summative: Exam, Review Packet Student Self: 3-2-1 Reports</p>	<p>Assessment (Data & Student Feedback):</p> <p>For the Pre-assessments I will have students complete a crossword puzzle first thing after coming back from vacation. This puzzle assessed their vocab knowledge and we will review it together as a class, identifying areas that may need more practice.</p> <p>For a formative assessment, students will complete a Geogebra project that they will then upload to the google drive folder. This will assess the content that we just learned from the previous section before the vacation as well.</p> <p>For the summative assessments students will complete an exam over everything they've learned. Before the exam though, they will take a review packet, which will be similar in content to the exam and they will be able to use it for practice.</p> <p>After they take the review packet I will have them do a 3-2-1 Report, which is beneficial to the students and myself. This is a great self-assessment and will help them identify the areas where they may need to study more or dedicate more time.</p>
<p>Integration of Other Content Areas: (If appropriate)</p> <p>This is by far the most English dependent section of the book, where students will have to write down their argument and try their best to convey their point through formal proof and logic.</p>	
<p>Instructional Strategies to Differentiate Whole Class Instruction:</p> <p>When it comes to proofs, some kids will prefer to sketch their drawing to prove their point, some will prefer a t-table, and some will prefer to write it up. The point being though is that I</p>	

am showing them 3 different ways to do proofs and that is essential to being able to do proofs. So I will show them all three and let them do some self exploration on Geogebra where they can explore what makes sense to them.

Modifications / Accommodations / Extensions For Individual Students with Identified Needs:

There are many ELL students in my classes, so to accommodate them I will have a presentation behind me with the instructions written down. In addition to this I will be verbally communicating with them and if written and verbal communication fails there will be time where I can work 1-on-1 with them to make sure they understand the content. The school also has an ESL teacher available as a resource to them outside of my classroom and they have their textbook available for more concentrated study. I also have a modified test that is less English dependent for the ELL students to take.

I will also be giving the students a choice of how they want to do their proofs, whether it be by t-table or written.

Technology Integration: (if appropriate)

- Geogebra
 - My personal favorite, I will have the students do a form of visual proof on Geogebra and they will show me some sort of graph and it will have a checklist rubric to go along with it. This may hit the Redefinition level of SAMR, if I'm really pleased with the assignments and I think the quality of work is high on them, then I may have them post and share them to Geogebra's website (or I may post them with their permission). I will also encourage the students who understand the application extraordinarily well to add some animation to their project.
- Quizizz
 - I will be doing a quizizz with them before the exam review day. This won't be graded but I will have them take it seriously and it will serve as a great pre-assessment as they come into class on review day.

Materials and Resources for Lesson Plan Development

Geogebra Rubrics (x30)
Exams (x30)
Review packets

Teaching & Learning Sequence:

Day 1 (90 minutes):

Review homework (5 minutes)
Review quizzes (5 minutes)
Presentation and voting of Projects, then talk about project grades (5 minutes)
Presentation of 2.5 & 2.6 (45 minutes)
Geogebra Presentation (15 minutes)
Homework time (15 minutes)

Day 2 (90 minutes):

Entrance Crossword (15 minutes)
Collect and Review Homework (5 minutes)
2.7 Presentation (30 minutes)
Brainstorm lists of theorems and postulates (15 minutes)
Multiple Intelligences quiz (20 minutes)
Homework Time (10 minutes)

Day 3 (90 minutes):
Review homework (10 minutes)
Go over Geogebra project (5 minutes)
Practice test / review packet (50 minutes)
The importance of proofs, the mathgen website (10 minutes)
3-2-1 Report (15 minutes)

Day 4 (90 minutes):
Test (90 minutes)

Content Notes:
See attached Smartboard presentations

Post-Lesson Reflection:

I feel as if these lessons also went very smoothly. I adapted mildly throughout to accommodate some of the classroom management challenges that I needed by creating a new seating chart. This vastly changed the tone in the classroom. Students appeared to be much more focused as well as responded well to the seating change.

Some things that I feel went well in this lesson were the multiple forms of assessment including the pre-assessments (like the crossword puzzle). These were received well by the students and helped break up the monotony of completing proofs together as a class over and over again. I'm also super proud that we were able to complete written proofs and have the kids understand it so well. It is my philosophy that written proofs are much more vital than the class t-table, two column proofs. So when I set out to achieve this goal, it went over nicely. Especially with the ELL students.

As for what I could have improved upon, I think that some of the content was a little too easy for them (example: all right angles are congruent) so to spice it up, I tried to show them the historical context of some of these theorems and why they are actually more interesting than they first appear. They didn't really get it, and I think they felt like I was babying them at times. With such easy content, I did find it a challenge to keep it fresh and challenge all of them consistently.

Overall I was very pleased with these lessons and the kids performed very well on their first exam made by me. I'm excited to see how the rest of these units will go with them!

