

## Lesson Plan (Math)

<b>Grade/ Grade Band:</b> 9 <sup>th</sup> grade Geometry	<b>Topic/Title:</b> 6-4: Properties of Special Parallelograms
<p><b>Brief Class Description (contextual information including number of students, subject, level, IEP/ELL/GT or other special considerations):</b></p> <p><b>Mod 1B:</b> This classroom environment is very relaxed. There are 30 students in the class, and there are many friends at tables which makes for productive noise. They feel comfortable joking around and having fun. There is one student who has had behavior problems with other teachers in the past, but he is said to have started new medication that will help this.</p> <p><b>Mod 3B:</b> This period of students is less confident and needs more guidance than the other class. There are 25 students in this class. There is a group of boys who can get loud, but with nonverbal and verbal communication they will settle.</p>	
<p><b>Brief Lesson Description (Overview/Abstract):</b> Students will learn and apply the definitions and properties of special parallelograms such as rectangles, rhombi, and squares by using white boards.</p>	
<p><b>Objective(s):</b> I can apply properties of special parallelograms in order to solve for unknowns.</p>	
<p><b>Prior Student Knowledge:</b></p> <p>Students have learned the properties and conditions of general parallelograms. This will also apply to special parallelograms.</p>	<p><b>Possible Preconceptions/Misconceptions:</b></p> <p>Students will not understand that a square is both a type of rectangle and a type of rhombus.</p>
<p><b>Common Core Standards:</b></p> <p><u>CCSS.MATH.CONTENT.HSG.CO.C.11</u></p> <p>Prove theorems about parallelograms. <i>Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.</i></p> <p><u>CCSS.MATH.CONTENT.HSG.GPE.B.5</u></p> <p>Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).</p> <p><b>NCTM:</b></p> <p>Analyze properties and determine attributes of two- and three-dimensional objects.</p> <p>Explore relationships (including congruence and similarity) among classes of two- and three-dimensional geometric objects, make and test conjectures about them, and solve problems involving them.</p> <p>Establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments made by</p>	<p><b>Standards for Mathematical Practices:</b></p> <p>Attend to Precision.</p> <p>Use appropriate tools strategically.</p> <p>Construct viable arguments and critique the reasoning of others.</p>

others.		
<b>Required materials:</b> Unit Chart White boards/markers/erasers	<b>Safety considerations:</b> N/A	<b>Technology Integration/Needs:</b> Projector
<p><b>ENGAGE:</b>  <b>(37 minutes)(53 minutes left)</b>  <b>Task:</b> At the beginning of class, a drill will be on the board for students to prepare for the quiz. Students will complete a quiz on sections 6-1 (Properties and Attributes of Polygons), 6-2 (Properties of Parallelograms), and 6-3 (Conditions of Parallelograms). When they turn it in, they will tell me if they felt confident, just okay, or bad about how they did.  When they are finished the quiz they will write down their homework and read the objective to themselves. Students will get out their charts with different quadrilaterals and properties on the top and side respectively. They will Turn and Talk <b>but not write</b> what properties they think should be filled for parallelograms. Then tables will be called to share one property they thought should be filled.</p> <p><b>Instruction:</b> <i>Teacher instruction</i> Student Answers  <i>"Your drill is up! It shouldn't take long, so I will give you 3 minutes to do it."</i>  <i>"What did we get as our coordinate, [student]?"</i>  Case 1: correct.  <i>"I got C at (2,4) because the distance between A and D will be the same as B and C so that's how I found the coordinate."</i>  <i>"When you turn in your quiz, tell me if you felt good, okay, or not so great about it. I'd like to know how you feel about this topic so far."</i>  <i>"Please write down your homework for tonight."</i>  <i>"I have given you a chart with a bunch of quadrilaterals on it. For now, I would like you to focus on parallelograms. Turn and Talk with your tables but <b>do not write anything</b> about what properties you think should be filled in for parallelograms."</i>  <i>"[student], what is one properties do you think should be filled in?"</i>  Congruent opposite sides  Parallel opposite sides  Congruent opposite angles  Diagonals bisect</p> <p><b>Transition:</b> "There are a bunch of other quadrilaterals on this chart aren't there? So keep this and don't lose it! What do you think we'll be talking about today?"</p> <p><b>Instructional Strategies:</b>  Chart  Cold Call</p>		

## **EXPLORE/EXPLAIN Cycle(s)**

### **EXPLORE:**

**(8 minutes)(45 minutes left)**

**Task:** Students will be asked to Turn and Talk about the definitions of rectangle, rhombus, and square. Tables will be cold called to share one definition they talked about.

### **Instruction:**

*"With your teams, turn and talk about what you think the definitions of rectangle, rhombus, and square are."*

*"What do we think, table [blank]?"*

*"They are all quadrilaterals."*

*"The sides of a square are the same."*

*"A rectangle has 90 degree angles."*

*"A rhombus has congruent sides."*

*"A square has equal angles."*

**Transition:** "Let's look at it from a geometric perspective."

### **Instructional Strategies:**

Turn and Talk

## **EXPLAIN (STUDENT CENTERED):**

**(25 minutes)(20 minutes left)**

**Task:** Students will write summaries/paraphrases of the theorems and definitions projected (properties of special parallelograms) in their notes. They will also copy down a diagram that clarifies special parallelograms (mainly that a square is both a rectangle and a rhombus). Then we will do a check for understanding using "Always, Sometimes, Never" in regard to statements about special parallelograms. This is also a preview for next class. Using graph paper, students will work with their groups to determine what type of quad a set of points yields.

### **Instruction:**

*"Please copy these definitions into your notes."*

*"Are there any questions about the properties of rectangles and rhombi?"*

*"A square is both a type of rhombus and rectangle, so it will have the properties of both as well."*

*"Quick check: Is a square a rhombus, always sometimes or never?"*

*"This slide is a diagram for you to copy. It should help you remember that a square is both a rectangle and a rhombus, and that all of those are types of parallelograms."*

**Transition:** "One person from each table please get two white boards!"

### **Instructional Strategies:**

Check for Understanding

Team work

## **ELABORATE:**

**(15 minutes) (5 minutes remaining)**

**Task:** Students will use white boards to extend to coordinate geometry. Projected on the board will be problems such as a set of points to graph, and students must plot those points and determine which special

parallelogram it is.

**Instruction:**

*"This slide is a problem using coordinate geometry. Please work on it in your groups."*

*"Be careful! It asks for the **most precise** name! Read your directions carefully."*

*"What type of quadrilateral is this?"*

Case 1: correct.

"A rhombus. The sides are all equal but the diagonals are not so it is a rhombus not a rectangle or square. "

Case 2: incorrect.

"It is definitely a rhombus because it looks like one."

*"Please do the next two problems with your partners. I will project the answers in a few minutes."*

*"Why is the first one a rectangle, rhombus, and square?"*

Case 1: correct.

"The sides are all equal distance and the diagonals are congruent so it is both a rhombus and a rectangle, and when that happens you have a square."

Case 2: incorrect.

"It's a parallelogram."

**Transition:** "Put your white boards away please!"

**Instructional Strategies:**

White boards

**COGNITIVE CLOSURE**

**(5 minutes)**

**Task:** A summary on the projector will be done as a shout out to evaluate what students know. Students will be asked to share one thing that they learned today. I will start with any volunteers, then cold call 2-3 people. They can share a property, a definition, or anything else they may have learned or clarified.

**Instruction:**

*"If the diagonals bisect each other, what quadrilateral is it?"*

Parallelogram.

*"What is one thing new that you learned today?"*

**Instructional Strategies:**

Cold Call

**EVALUATE:**

**Diagnostic Assessment(s):** The student self-evaluation of the quiz will give me an idea of how confident they are about what they know about properties and conditions of parallelograms, which is a building block for today's lesson.


**Formative Assessment(s):** I can assess what students know by the Check for Understanding (Always, Sometimes, Never) and what the students share at the end of class (what they learned today).

**Summative Assessment(s): Chapter 7 Test 4/20/18**

**Timing/Pacing Adjustments (Slinky Time):** Include a plan for how to adjust instruction if tasks take longer/shorter than anticipated:

If there is more time, instead of a simple share closure I can have students do a round robin. Each student gets out a sheet of paper and has 10 seconds to write down one property they learned today without looking at their notes. Then the papers get moved clockwise and the second person adds a property in 10 seconds. This continues until all table members have participated. Then 3 students will share what their team wrote on their paper. (+5 mins)

If there is less time, I can pick and choose which coordinate geometry extension problems I do instead of doing all of them. (-5 mins)

Property	Parallelogram	Rectangle	Rhombus	Square	Trapezoid	Kite
Opposite sides are parallel						
Opposite sides are congruent						
Opposite angles are congruent						
Diagonals are congruent						
Diagonals are perpendicular						
Diagonals bisect each other						
All angles are right angles						
All sides are congruent						