LESSON PLAN TEMPLATE

Lesson Title	Unlocking Geometric Relationships: Pythagorean Theorem and Triangle Inequalities
Learning Area/s	Mathematics
Name of Teacher/s	DepED Tambayan
Grade Level and Section	Grade 8
No. of Sessions	4 Sessions
References	None specified
Declaration of AI use	This lesson plan was co-created using Gemini AI to assist with unpacking competencies into a 4-session learning design, structuring activities, and assessment formulation.

Intentions.

Meaningful learning experiences are anchored in how we frame them. Start by deciding what you want learners to master by the end of the lesson – keep it clear and simple.

Learning Competency and Curriculum Standards:	**Learning Competency:** Measurement and Geometry ● Apply the Pythagorean Theorem in finding the missing side of a right triangle, and its converse in classifying triangles. ● Apply the triangle inequality theorems to establish results for angles and sides in triangles. **Content Standards:** The learners should have knowledge and understanding of... • volume of pyramids (other than square and rectangular pyramids), cones, and spheres • the Pythagorean Theorem • triangle inequality theorems • earning money, profit and loss, 'best buys', buying on terms • linear equations in one variable • linear inequalities in one variable and their graphs **Performance Standards:** By the end of the term, the learners are able to... ● finds the volume of pyramids other than square and rectangular pyramids, and the volumes of cones and spheres. ● use the Pythagorean theorem to find sides in right triangles and its converse to classify triangles. ● use the triangle inequality theorems to establish results for angles and sides in triangles. ● solve financial problems involving earning money, profit and loss, "best buys, " and buying on terms. ● solve linear equations and linear inequalities in one variable. ● graph linear inequalities in one variable.

	Session 1	Session 2	Session 3	Session 4
Learning Objectives:	By the end of the session, the learners should be able to: ● Explain the relationship between the sides of a right triangle using the Pythagorean Theorem. ● Calculate the length of the missing side (hypotenuse or leg) of a right triangle in real-life Filipino construction contexts.	By the end of the session, the learners should be able to: ● Apply the Converse of the Pythagorean Theorem to determine if a triangle is acute, right, or obtuse. ● Justify the classification of triangles based on side lengths using local designs like weaving patterns.	By the end of the session, the learners should be able to: ● Apply the Triangle Inequality Theorem to determine if three given lengths can form a triangle. ● Relate the lengths of the sides of a triangle to the measures of its opposite angles.	By the end of the session, the learners should be able to: ● Apply the Hinge Theorem (SAS Inequality) to compare side lengths and angles in two triangles. ● Solve real-life problems involving triangle inequalities in the context of Filipino household items.
Learner Context:	The learners show high engagement when mathematical concepts are linked to physical structures. Most students are proficient in basic arithmetic but approximately 30% struggle with finding square roots manually. There is a strong preference for visual representations of geometric figures. Some learners exhibit difficulty in translating word problems into algebraic equations,	Learners enjoy collaborative tasks and competitive games. While they can perform calculations, they often forget to compare the square of the longest side (c^2) with the sum of the squares of the other two sides ($a^2 + b^2$). Some learners with hearing impairments benefit significantly from the visual 'Comparison Chart' displayed in the room.	Learners are highly kinesthetic and respond well to tactile activities. A small group of learners has difficulty with abstract spatial reasoning. Most students demonstrate strength in identifying larger/smaller numbers but struggle to connect side lengths to angle sizes without physical models.	Learners are becoming more confident in justifying their answers but still require scaffolding for complex word problems. They show a preference for peer-tutoring. A potential barrier is the transition from single-triangle theorems to comparing two different triangles (Hinge Theorem).

	particularly when English terminology is complex.			
Learning Experience. **A learning experience is like a thoughtfully designed journey. Each activity and interaction builds towards meaningful understanding and growth. Identify activities and interactions to help learners gain knowledge, skills, or understanding in a purposeful way.**				
Pre-Lesson:	**Square Number Sprint:** A 3-minute activity where students quickly list the squares of numbers from 1 to 20 on their individual whiteboards or slates to activate prior knowledge of perfect squares.	**Inequality Review:** A quick 'Greater Than, Less Than, or Equal' game using squared numbers to prepare for the comparison step of the converse theorem.	**Segment Snap:** Students are given three strips of paper of varying lengths (e.g., 2in, 3in, 6in) and asked to try and form a triangle.	**The Pamaypay Opening:** Use a traditional folding fan (pamaypay). Open it at two different angles and ask which 'opening' creates a wider distance between the two ends of the fan.
Flow:	**1. Introduction (The Carpenter's Rule):** Present a scenario involving a 'Carpintero' building a 'bahay kubo' roof. Use a diagram of a roof truss to identify the right triangle formed by the king post and the rafters. **2. Modeling (Scaffolding):** Demonstrate the Pythagorean Theorem formula ($a^2 + b^2 = c^2$) using a 3-4-5 triangle example based on local floor tiling. Explicitly show the step-by-step process of	**1. Hook:** Show images of 'Banig' (woven mats) or 'Inabel' fabrics. Identify various triangles within the patterns and ask students to guess their types (acute, obtuse, right). **2. Exploration (Social Learning):** In small groups, students measure pre-cut triangular cutouts inspired by 'Parol' (star lantern) frames. They record the lengths and calculate c^2 vs. ($a^2 + b^2$). **3. Concept Building:** Define the rules: if $c^2 = a^2$	**1. Discovery Activity:** Using 'Walis Tingting' (broomsticks) cut into different lengths, students work in pairs to discover the rule that the sum of any two sides must be greater than the third side. This is the 'Shortcut to the Jeepney Stop' analogy (the direct path vs. the two-leg path). **2. Direct Instruction:** Formulate the Triangle Inequality Theorem ($a+b > c$). Connect this to 'The Great-Small Rule' (longest side	**1. Demonstration:** Use two doors in the classroom or two 'pamaypay'. If the hinges are the same (same side lengths), how does the angle of the opening affect the distance between the tips? Define the Hinge Theorem. **2. Scaffolding (Comparison Table):** Provide a table where students compare Triangle A and Triangle B. They identify two pairs of congruent sides and then use the included angle to predict the third side's length

	squaring, adding, and taking the square root. **3. Guided Practice (Checks for Understanding):** Use 'Think-Pair-Share' where pairs solve for the length of a ladder leaning against a wall, a common sight in local renovations. Circulate to provide immediate feedback on calculation errors. **4. Active Retrieval:** Students use a 'Triangle Challenge' card where they must identify which given sets of lengths form a right triangle by checking the theorem's validity.	+ b^2 (Right); if $c^2 < a^2 + b^2$ (Acute); if $c^2 > a^2 + b^2$ (Obtuse). Provide a visual anchor chart for these rules. **4. Scaffolding:** Solve three examples together, ranging from simple integers to those requiring careful comparison of larger numbers.	is opposite the largest angle). **3. Modeling:** Show a map of three local landmarks (e.g., Church, Market, School). If the distance from Church to Market is 5km and Market to School is 3km, what are the possible distances for Church to School? **4. CFU (Whiteboard Check):** 'Can a triangle have sides 7, 10, and 19?' Students vote with thumbs up/down and explain why.	relative to the other triangle. **3. Group Activity (Social Learning):** 'The Sari-Sari Store Delivery': Groups solve a problem comparing two delivery routes that form triangles with two equal side lengths but different turn angles. They must decide which route is longer. **4. Active Retrieval:** Quick-fire rounds where the teacher shows two triangles on the board and students shout 'Hinge!' when they see the conditions for the Hinge Theorem met.
Learning Resources:	● Geometry sets (rulers and protractors) ● Diagrams of local architectural structures (Bahay Kubo, Vigan Houses) ● Calculators (for verification)	● Sample Banig or Inabel patterns ● Cardboard triangle cutouts of different types ● Comparison Anchor Charts	● Walis Tingting or drinking straws ● Local maps/sketches ● Protractors for angle verification	● Traditional Pamaypay (folding fans) ● Classroom door/hinges ● Worksheet with paired triangles
Opportunities for integration:	Integration with **TLE (Technical Drafting/Carpentry)** by discussing the importance of	Integration with **MAPEH (Arts)** through the analysis of geometric shapes	Integration with **Araling Panlipunan (Geography)** by calculating	Integration with **Science (Physics/Mechanics)** by discussing how hinges and

	right angles in structural stability.	in indigenous Filipino textiles.	possible distances between Philippine provinces on a map.	angles affect the movement of tools and body joints.
Assessment. **Assessments reveal what learners have gained and what they still need help with. These are helpful in providing you with information to guide your future instruction throughout the entire session.**				
Formative Assessment:	**Exit Ticket:** Solve for the missing side of a right triangle representing a diagonal path across a local plaza. Students must show their complete solution and label the hypotenuse correctly.	**Classification Race:** Provide three sets of side lengths. Students must classify them within 2 minutes and write a one-sentence justification for each (e.g., 'It is obtuse because 100 > 36 + 49').	**Mapping Challenge:** Given a triangle with angles 40°, 60°, and 80°, students must label which side is the shortest and which is the longest based on the theorem, then verify by measuring a scale drawing.	**Written Problem Solving:** A 5-question quiz involving both the Triangle Inequality Theorem and the Hinge Theorem, using scenarios like the swing of a 'Duyan' (cradle) or the opening of a 'Gunting' (scissors).
Ways Forward. **Meaningful learning can also happen beyond the classroom – for both the learners and the teacher. Pause and reflect on what happened today.**				
Extended learning opportunities:	For students needing support: Provide a 'Square Root Table' for reference. For advanced learners: Investigate Pythagorean Triples found in nature or art.	Task students to find three objects at home that form a triangle and use their measurements to classify the triangle type for tomorrow's sharing.	Provide a 'Range Finder' worksheet where students find the possible range of the third side given two sides of a triangle.	Advanced Task: Create a 'Geometry in Motion' poster showing three items in the house that demonstrate the Hinge Theorem (e.g., scissors, laptop lids, pliers).
Reflections:	How many students were able to correctly identify the hypotenuse? Did the use of local construction examples increase student	Did the visual patterns help learners distinguish between the three triangle types? Are learners consistently identifying the	Was the 'Walis Tingting' activity effective in helping kinesthetic learners understand the theorem? How did students react to the map-based	Did the 'Pamaypay' analogy bridge the gap between abstract theory and physical reality? Which learners still struggle with the logic of comparing

	participation compared to previous abstract geometry lessons?	longest side as 'c'?	problem?	two triangles?