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|  | **DAILY LESSON LOG**  **GRADES 7 TO 12** | **School** | Tuao High School | **Grade Level** | 8 |
| **Teacher** | Carl Hendrick O. Rabut | **Learning Area** | Mathematics- Statistics and Probability |
| **Time** |  | **Quarter** | IV |

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| 1. **OBJECTIVES** |  |
| A. Content Standards | The learner demonstrates understanding of key concepts of inequalities in a triangle, and parallel and perpendicular lines. |
| B. Performance Standards | The learner is able to communicate mathematical thinking with coherence and clarity in formulating, investigating, analyzing, and solving real- life problems involving triangle inequalities, and parallelism and perpendicularity of lines using appropriate and accurate representations |
| 1. Learning Competencies / Objective | The learner illustrates theorems on triangle inequalities (Exterior Angle Inequality Theorem, Triangle Inequality Theorem, Hinge Theorem). **M8GE-IVa-1**  **At the end of the session, the students should have**  **-**defined the theorems on triangle inequalities  -illustrated the theorems by solving problems involving the triangle inequality theorems  -developed deeper appreciation of the lesson and its practical applications |
| **II. CONTENT** | **Triangle Inequality Theorems** |
| **III. LEARNING RESOURCES** |  |
| A. References |  |
| 1. Teacher’s Guide Pages |  |
| 2. Learner’s Materials Pages |  |
| 3. Textbook Pages |  |
| 1. Additional Materials from   Learning Resources (LR) Portal | *K to 12 Curriculum Guide MATHEMATICS (Grade 1 to Grade 10)*. Department of Education, 2016.  *“Curriculum Implementation and Learning Management Matrix.”* Department of Education, 2020. |
| B. Learning Resources |  |

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| **IV. PROCEDURES** | **Session 1** | **Session 2** | **Session 3** | **Session 4** |
| A. Reviewing previous lesson or presenting the new lesson | Start the session with a game called In or Out where the students try and tell whether a picture shows an interior or exterior.  **Activity: “In or Out, am I in or out?”**  Show a picture on the screen. Have them show their thumbs up if they think the image shows an interior or thumbs down if it shows an exterior. | **Activity: Possible or Impossible**  Display a statement on the screen related to triangle properties, such as "A triangle can have two right angles."  Instruct the learners to determine if the statement is possible or impossible and to show their answer by holding up a card with "Possible" or "Impossible" written on it.  Encourage discussion among the learners to explain their answers.  *“What did you learn from the statement presented on the screen?”*  *“Did you find the statement possible or impossible? Why?”* | Show the learners the pair of congruent legs of a triangle. Ask them the question, what do you think would happen to the opposite side when the angle is reduced/increased. Leave it as a cliffhanger and proceed to say that that would be the lesson for today.   * *What do you remember about congruent segments and angles?* * *How can we compare two triangles that have two congruent sides each?* * *What do you think will be the effect of changing the angle between the congruent sides on the opposite side?*   *“Today, we will learn about a theorem that can help us answer these questions. It is called the hinge theorem.”* | Ask students to recall the definitions and properties of exterior angles, triangle inequality and congruent triangles.  Write down the key terms and formulas on the board or a slide. |
| B. Establishing a purpose for the lesson | Explain to the learners that the purpose of the lesson is to review the Exterior Angle Inequality Theorem and strengthen their ability to identify interior and exterior angles of polygons. | Explain to the learners that the purpose of the lesson is to introduce the Triangle Inequality Theorem and to help them understand the relationships between the sides and angles of a triangle. | Tell the learners that the hinge theorem is a useful tool to compare the lengths of sides and angles in triangles that have two congruent sides. Explain that this theorem can help them solve problems involving triangles and other shapes.   * *Why do you think it is important to compare sides and angles in triangles?* * *What are some examples of problems or situations that involve triangles with two congruent sides?*   *How do you think the hinge theorem can help us solve these problems or situations?* | Explain to the students that they will review three important theorems related to triangles: the Exterior Angle Inequality Theorem, the Triangle Inequality Theorem and the Hinge Theorem and its converse.  Tell them how these theorems can help them solve problems involving angles, sides and congruence of triangles. |
| C. Presenting examples/instances of the new lesson | Begin by showing students a triangle.  Extend one of the sides. As this is being done, a new angle has been formed outside of the triangle.  Make an analogy with the previous game in or out.  “What do you call the angles inside the triangle”  “If these are called interior, how do you think you would call the angle formed outside.” | Display three sets of sticks, each with a base measuring 30cm:  Set A with two legs whose sum of length is greater than the base,  Set B with two legs whose sum of length is less than the base, and  Set C with two legs whose sum of length is equal to the base.  Instruct the learners to determine which set of sticks forms a triangle and to explain their reasoning.  *"Which set of sticks formed a triangle and why?"* | Have the learners find out the answer for the question in part A. Help them discover that when the angle has been reduced, then the side will also be shorter and vice versa. Use the pair of legs as a visual aid and demonstrate how changing the angle affects the opposite side.   * *What did you observe when you changed the angle between the congruent sides?* * *How did the length of the opposite side change when you increased or decreased the angle?*   *Can you explain why this happens using your knowledge of triangles and angles?* | Show an example of a diagram with an exterior angle of a triangle and label it as x.  Ask students to explain how to use the Exterior Angle Inequality Theorem to find the value of x or any of the interior angles given some information. |
| D. Discussing new concepts and practicing new skills in #1 | Prepare 3 copies of the same triangle. Paste one on the board.  Make a line extending one side of the triangle.  Ask the students questions regarding the relation of the measurements of the interior and exterior triangles.  Wait for someone to be able to figure out that the measure of an interior triangle non adjacent to the exterior angle is always less than that of the exterior angle itself.  Let a learner go in front. Bring out a copy of the triangle and have the learner use it to compare the measurements.  “Can you determine the non-adjacent angles to the exterior angle of the triangle?”  “What have you observed on the measurements of the interior angles and the exterior angles?”  With this, introduce the Exterior angle inequality theorem.  Ask the students the measurement of the angle formed by a straight line and the sum of triangles interior angles.  Using this, come up with the idea that the sum of the two non-adjacent interior angles is equal to the measurement of the exterior angle.  Have a student show it in front with the use of the copies of the triangles.  *“How did you figure out that the measure of a non-adjacent interior angle is always less than the measure of the exterior angle?”*  *“Can you explain the Exterior Angle Inequality Theorem in your own words?”* | Ask the learners to observe the sets of sticks and to think about the relationship between the length of each leg and the validity of the set as a triangle.  Encourage the learners to discuss their observations with their peers and to share their ideas about the relationship between the length of the legs and the possibility of forming a triangle.  Wait for the learners to come up with the Triangle Inequality Theorem on their own.  *"What observations did you make about the relationship between the length of each leg and the possibility of forming a triangle?"*  *"How did you use your observations to come up with the Triangle Inequality Theorem?"* | Work with the pair of legs and have them compare the length of the sides depending on the measure of the interior angle. Aid them in finding out that for a pair of congruent legs, when the angle is smaller in one of them, then the opposite side would also be shorter and the other way around. At this point, tell them that this is the concept of the hinge theorem.   * *How can we use hinge theorem to compare two triangles that have two congruent sides each?*   *What are some conditions or assumptions that we need to make when using hinge theorem?* | Show an example of a diagram with three sides of a triangle and label them as a, b and c.  Ask students to explain how to use the Triangle Inequality Theorem to check if a triangle is possible or not given three side lengths. |
| E. Discussing new concepts and practicing new skills in #2 | Now, incorporate measurements to the triangle and its exterior angle.  Complete a list of statements on the relationships of the measurements including the comparison between the non-adjacent interior angles and the exterior angle, the equality of their sum to the exterior angle, and the supplementary relationship between the third interior angle and the exterior angle. | Now that the learners have observed the relationship between the sides of a triangle, it's time to introduce the Triangle Inequality Theorem.  Start by providing the definition of the theorem: "The sum of the lengths of any two sides of a triangle must be greater than the length of the third side."  After providing the definition, give another example of a set of three side lengths and ask the learners if the set can form a triangle or not. Discuss the reasoning behind their answers and ask them to apply the Triangle Inequality Theorem to prove or disprove the set's validity as a triangle.  Next, provide an example where the length of the base and the length of one of the legs are given, and ask the learners to determine the minimum length that the other leg must be in order for the set to form a triangle. Encourage the learners to use the Triangle Inequality Theorem to find the answer.  Make sure to give enough time for the learners to work through the examples and ask questions as needed.  *"Can you explain the definition of the Triangle Inequality Theorem in your own words?"*  *"Can you apply the Triangle Inequality Theorem to prove or disprove the validity of the example sets of side lengths?"*  *"How did you use the Triangle Inequality Theorem to determine the minimum length of the other leg given the length of the base and another leg?"* | Now proceed with talking about what happens when the length of a side is shorter instead.   * *“How would you compare the angles inside?”*   Help them discover that for a pair of congruent sides, when one side is shorter than the other, then the angle opposite to it is smaller than the other angle. Use the pair of legs again and show how changing the length of one side affects the opposite angle. | Show an example of a diagram with two triangles that share a common side and label them as ABC and ABD.  Ask students to explain how to use the Hinge Theorem and its converse to compare the areas or perimeters of two triangles given some information. |
| Developing mastery | Activity: **Inequality Statements and Relationships**  Draw a triangle on the board or use a visual aid to show a triangle to the class.  Extend one of the sides of the triangle to create an exterior angle.  Have the students copy the triangle in their notebooks and label the interior and exterior angles.  Instruct the students to identify and list all of the inequality statements and other relationships they can find involving the angles and sides of the triangle.   * The measure of the exterior angle is greater than the measure of either of its corresponding remote interior angles. * The sum of the measures of the two remote interior angles is equal to the measure of the exterior angle. * The measure of an interior angle plus the measure of its adjacent exterior angle is 180 degrees. * The sum of the measures of two interior angles is always greater than the measure of the third angle.   After the students have had sufficient time to work on this activity, go over the inequality statements and relationships as a class to reinforce their understanding of the concepts. | **Activity: Triangle Construction Challenge**  Divide the learners into groups and give each group a set of three sticks of different lengths. Instruct them to cut the sticks to form a triangle and to name it based on the length of its sides.  After forming the triangle, have the groups measure each side and record the measurements. Then, ask them to write an expression for each side showing that it is less than the sum of the other two sides.  Encourage the groups to share their triangles with the class and to explain how they constructed them. This activity will help the learners to develop mastery in applying the Triangle Inequality Theorem.  *"How did you use the Triangle Inequality Theorem to write an expression for each side showing that it is less than the sum of the other two sides?"* | Give the learners some practice problems to apply this lesson.  For example, given two triangles with two congruent sides each, compare their third sides or angles using this lesson. Or given a triangle with two congruent sides and an angle, find the length of the third side or angle using this lesson. | Ask them some questions that require them to apply all three theorems learned in this lesson.  Have them answer individually or in groups and check their answers with you or their peers. |
| G. Finding practical application of concepts and skills in daily living | Discuss with students the practical applications of the Exterior Angle Inequality Theorem in real-life situations. For example, engineers use this theorem to design bridges and buildings that are stable and structurally sound. Other practical applications of this theorem include land surveying, navigation, and architecture.  To help students understand the significance of the Exterior Angle Inequality Theorem in daily life, you can show them examples of how it is used in real-world scenarios. For instance, you can show them how land surveyors use this theorem to measure distances and angles accurately. Similarly, architects use this theorem to design buildings that are safe and functional.  *“Can you think of any other real-life situations where the Exterior Angle Inequality Theorem might be useful?”*  *“Why do you think it's important for engineers, architects, and surveyors to understand this theorem?”* | Let the students think of uses for the Triangle Inequality Theorem in everyday life. Encourage them to think beyond just geometry and consider how this concept may apply to other fields such as engineering, architecture, and even art. Have the students share their ideas with the class and discuss how the Triangle Inequality Theorem can be useful in solving real-world problems.  You can also provide some examples to get them started, such as using the Triangle Inequality Theorem to determine the minimum length of a ladder needed to reach a certain height on a building or using it to determine the minimum length of piping needed to connect two points in a plumbing system. Encourage the students to think creatively and critically about the practical applications of this theorem.  *"Can you think of any other practical applications of the Triangle Inequality Theorem besides the examples provided?"*  *"How can the Triangle Inequality Theorem be useful in solving real-world problems in fields such as engineering, architecture, and art?"*  *"Why do you think it's important to understand how mathematical concepts like the Triangle Inequality Theorem can be applied in real-world situations?"* | Have them think of things where they can use this lesson. For example, they can use it to find out how tall a tree is by measuring its shadow and comparing it to another object with a known height and shadow length. Or they can use it to find out how wide a river is by measuring an angle from one bank to another and comparing it to a known distance on one bank.  You can also tell them that this lesson can be used in real life to design bridges, roofs, tents, kites, and other structures that involve triangles.   * *"Can you think of any other examples where you can use this lesson in real life?*   *What are some benefits or advantages of using this lesson in real life?* | Ask students to think of some situations where they can use these concepts and skills in their daily lives or future careers. |
| H. Making generalizations and abstractions about the lesson | Recall the lesson by asking the students to reflect on what they have learned about the Exterior Angle Inequality Theorem. Encourage them to share their insights and to discuss how they can apply this theorem in real-life situations. Finally, conclude the lesson by emphasizing the importance of understanding the fundamental principles of geometry and how they can be used to solve problems and make informed decisions in various fields.  *“What did you learn about the Exterior Angle Inequality Theorem today?”*  *“How do you think you can apply what you learned in this lesson to other areas of your life?”* | Ask the students to briefly summarize what they have learned about the Triangle Inequality Theorem. Encourage them to share their observations, insights, and generalizations about the relationship between the three sides of a triangle. Ask them to provide real-life examples where the theorem could be useful, such as in engineering or construction. Finally, ask them to reflect on their learning and identify any areas that they may still need to work on or clarify.  *"What generalizations can you make about the relationship between the length of each leg and the possibility of forming a triangle?"*  *"How can you apply the principles learned in this lesson to other geometric concepts and theorems?"* | Have the learners recap the lesson by summarizing what they learned about the hinge theorem and its converse and how they can be used to compare sides and angles in triangles with two congruent sides.   * *What is the main idea of the hinge theorem and its converse?* * *How can we apply the hinge theorem and its converse to different situations or problems?*   *What are some key words or phrases that we can use to remember the hinge theorem and its converse?* | Summarize the main points and objectives of the lesson with the students.  Have them repeat or write down the definitions and formulas of each theorem.  Ask them to explain how these concepts are related and why they are important. |
| I. Evaluating learning | Distribute a worksheet on Exterior Angle Inequality. Instruct students to read the directions carefully before beginning the worksheet and ask students to show all work and write their answers in the space provided. | Display a set of three lines on the board or screen.  Line AB: 15 cm  Line AC: 10 cm  Line BC: 30 cm  Instruct the learners to individually determine if the lines can form a triangle or not. If it is possible, they should write "Possible" on a piece of paper, and if not, they should write "Impossible."  Encourage the learners to show their work or reasoning in finding the minimum length of the third line.  Next, ask the learners to find the minimum length of the third line to make sure that it is possible to form a triangle. They should write their answer on the same piece of paper.  Collect the papers and check the answers. | Give them a problem where two persons left their house at the same time and same distances but turned once at a different angle each. Ask them who they think is now farther from their house and why.  Possible problem:  Alice left her house at noon and walked due north for 1.6 kilometers. Then she turned N60°E and walked another 1.6 kilometers. Bob left his house at noon and walked due south for 1.6 kilometers. Then he turned S120°E and walked another 1.6 kilometers. Who is now farther from their house? Explain your answer using what you learned today.4rb890i | Show problems on the board that cover the topics of Exterior Angle Inequality Theorem, Triangle Inequality Theorem and Hinge Theorem and its converse.  Have students solve them individually and show their work on a paper or a notebook.  Check their answers with you or their peers and explain the correct solutions and reasoning.  Give them feedback on their strengths and areas for improvement. |
| J. Additional activities for application or remediation |  |  | For those who need more practice or challenge, you can give them some additional activities such as:  Finding out how many different triangles can be formed with two congruent sides and an angle using geometric constructions.  Exploring how changing one element (side or angle) affects all other elements in a triangle using dynamic geometry software.  Investigating how other properties of triangles (such as area, perimeter, or centroid) are related to the hinge theorem using algebra or calculus. |  |
| Closing |  |  | Congratulate them on learning a new concept and skill and encourage them to apply it in their future studies or projects. | Thank students for their participation and effort in this lesson.  Preview what they will learn next time and how it connects to this lesson. |

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| **V. REMARKS** |  |  |  |  |
| INTEGRATION  (Values, Thrusts, Program Activities & Projects) |  |  |  |  |
| **VI. REFLECTION** |  |  |  |  |
| A. No. of learners who earned 80% in the evaluation |  |  |  |  |
| B. No. of learners who require additional activities for remediation whose scored below 80% |  |  |  |  |
| C. Did the remedial lessons work? No. of learners who have caught up with the lesson |  |  |  |  |
| D. No. of learners who continue to require remediation |  |  |  |  |
| E. Which of my teaching strategies worked well? Why did these work? |  |  |  |  |
| F. What difficulties did I encounter which my principal or supervisor can help me solve? |  |  |  |  |
| G. What innovation or localization materials did I used/discover which I wish to share with other teachers? |  |  |  |  |

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Student-Teacher Cooperating Teacher