

**Gifted Education School Network 2023/24**  
**KLA/ Cluster: Secondary Mathematics**  
**Lesson Design**

*Acknowledgement: This lesson example was adapted/adopted from the tryout by PLK Choi Kai Yau School*

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| <b>Key Learning Area:</b>                 | Mathematics  |
| <b>Level:</b>                             | Secondary 2  |
| <b>Topic</b>                              | Pythagoras Theorem   |
| <b>Learning Objectives:</b>               | <p>For average students:</p> <ul style="list-style-type: none"> <li>● Students can use the papers of specific shapes to to measure the lengths and angles to estimate the heights of the buildings</li> <li>● Students can solve the problems relating to trigonometry</li> </ul> <p>For gifted/more able students:</p> <ul style="list-style-type: none"> <li>● Students can formulate strategies to solve a challenging open problem involving trigonometry</li> </ul> |
| <b>Prior Knowledge of students:</b>       | <ul style="list-style-type: none"> <li>● Trigonometric ratios</li> <li>● Pythagoras Theorem</li> </ul>   |
| <b>Highlights of this lesson example:</b> | <ul style="list-style-type: none"> <li>● This lesson example demonstrates the merits of exploratory task as a learning tool.</li> <li>● This lesson example gives the students an opportunity to apply the mathematical knowledge.</li> <li>● The less able students start analysing the problem with simple situation while;</li> <li>● Mathematically gifted/more able students can learn deeper through the challenging activities.</li> </ul>                        |
| <b>Strategies employed:</b>               | In order to cater for the specific learning needs of students in a mixed ability class, differentiation strategies could be employed to maximise the learning outcomes of students. Differentiated instruction helps less able students to get ready for the lesson and gives challenges to the gifted/more able students.   |

| Flow of Learning Activities  | Rationale and Tips for Implementation  |
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| <p><b>1) Investigation</b></p> <ul style="list-style-type: none"> <li>● Brief introduction of Pythagoras</li> <li>● Lead discussion into the Pythagoras' theorem</li> </ul>  | <ul style="list-style-type: none"> <li>✧ Guide students in discussion</li> <li>✧ Use of visual aids, such as pictures, to help students visualize and understand Pythagoras' contributions</li> </ul>  |
| <p><b>2) Development:</b></p> <p><b>Discovery Activity 1 (Challenge 1)</b></p> <ul style="list-style-type: none"> <li>● Pythagoras' theorem proof</li> <li>● Using the shapes given, working as a group, create 2 squares and prove that their areas are the same. (Proof 1)</li> </ul> <p><b>Discovery Activity 2 (Challenge 2)</b></p> <ul style="list-style-type: none"> <li>● Pythagoras; theorem proof</li> <li>● Using the shapes given, working as a group, create 2 squares and prove that their areas are the same.(Proof 2)</li> </ul> | <ul style="list-style-type: none"> <li>✧ Allow students to interact and discuss ideas to discover the proof</li> <li>✧ Offer interactive activity, for students to gain hands-on and visual learning experiences</li> <li>✧ Provide scaffolding for struggling students by breaking down the steps of the proof</li> <li>✧ Encourage higher-level thinking by challenging advanced students to explore alternative methods of proof</li> </ul>                       |
| <p><b>3) Consolidation</b></p> <ul style="list-style-type: none"> <li>● Pythagoras' theorem terminologies</li> <li>● Practice questions (finding hypotenuse)</li> <li>● Practice questions (finding leg)</li> <li>● Discovery Activity 3 (Challenge 3)</li> <li>● Finding the unknown when 2 sides contains variable</li> </ul>  | <ul style="list-style-type: none"> <li>✧ Differentiate the difficulty level of the questions, providing a range of options from basic to challenging.</li> <li>✧ Offer additional support, such as hints or step-by-step guides, for struggling students.</li> </ul> <p><b>For gifted/more able students:</b></p> <ul style="list-style-type: none"> <li>✧ Provide extension activities or open-ended questions for advanced students to explore further.</li> </ul> |
| <p><b>4) Making conclusion and extending the problem</b></p> <ul style="list-style-type: none"> <li>● Plenary</li> <li>● Review Pythagoras' theorem (terminologies, right angle)</li> <li>● Take home thoughts - What if triangles are not right-angled?</li> </ul>  | <p><b>For average students:</b></p> <ul style="list-style-type: none"> <li>✧ Summarize the key concepts and terminologies covered in the lesson, highlighting their practical significance</li> </ul>  |

**For gifted/more able students:**

- ✧ Encourage students to reflect on their learning by asking open-ended questions or engaging in a class discussion.