

Title: Using Trigonometry for Design (AI HL 3.8)

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Subject and/or related curriculum/pedagogy: DP Mathematics AI HL 3.8

Audience: Students

Learning time: Approximately 2-3 hours

Overview:

This activity consists of two parts: Handout 1 on Rectangular or Trapezoidal Mini Garden Design and Handout 2 on Designing a Motif Using the Sine-Ambiguous Case. All activities are designed to be printed directly for students. While producing the materials, I followed a certain point of view to help students develop their creativity and open-minded thinking skills. In this set, an application has been shared on how we can use trigonometric equations in architectural design and art by going beyond the classical patterns. For the first time, students were taught the basics of three-dimensional graphic drawing step by step. It ignites the creativity of students who will do IA. The first activity has the use of the Hessian matrix on bivariate function analysis for the teacher set only. This set is also can be considered good practice for Paper 3-style questions.

Subject guide content covered includes:

Sub-Topic AHL 3.8 Content

- The definitions of $\cos \theta$ and $\sin \theta$ in terms of the unit circle.
- The Pythagorean identity: $\sin^2\theta + \cos^2\theta = 1$
- Definition of $\tan \theta$ as $\frac{\sin \theta}{\cos \theta}$
- Extension of the sine rule to the ambiguous case.
- Graphical methods of solving trigonometric equations in a finite interval.

Teacher materials included in this set:

- Teacher Notes: Rectangular or Trapezoidal Mini-Garden Design
- Teacher Notes: Designing Motifs by Using the Sine-Ambiguous Case

Student materials included in this set:

- Handout 1: Rectangular or Trapezoidal Mini-Garden Design
- Handout 2: Designing Motifs by Using the Sine-Ambiguous Case