VCE Mathematical Methods Unit 2

Sample context for assessment: Perimeter and area of a rectangle

Introduction

This short task has two parts. The first part is to be completed without technology, and the second part is to be completed with technology.

Part 1

Consider a rectangle with width *w* and length *l*.

 Width, *w*

 Length, *l*

Let the rectangle have a fixed perimeter of 100 cm and vary its area.

1. Specify the area of the rectangle as a function of its width and state the domain and range of this function.
2. Draw the graph of this function.
3. Find the maximum and minimum values for the area of the rectangle and the dimensions for which these occur.

Now let the rectangle have a fixed area of 600 cm2 and vary its perimeter.

1. Specify the perimeter of the rectangle as a function of its width and state the domain and range of this function.
2. Draw the graph of this function.
3. Find the maximum and minimum values for the perimeter of the rectangle and the dimensions for which these occur.

Part 2

The rectangle with width *w* and length *l* has a semi-circle with diameter *w* attached at one end and a half-square triangle with altitude *w* attached at the other end, forming a composite shape.

Draw and label this composite shape.

Let the shape have a fixed perimeter of 100 cm and vary its area.

1. Specify the area of the shape as a function of *w* and state the domain and range of this function.
2. Graph this function.
3. Find the maximum and minimum values for the area of the shape and the dimensions for which these occur.

Now let the shape have a fixed area of 600 cm2 and vary its perimeter.

1. Specify the perimeter of the shape as a function of *w* and state the domain and range of this function.
2. Graph this function.
3. Find the maximum and minimum values for the perimeter of the shape and the dimensions for which these occur.

Areas of study

The following content from the areas of study is addressed through this task.

|  |
| --- |
| **Unit 2** |
| **Area of study** | **Content dot points** |
| Functions and graphs | – |
| Algebra | – |
| Calculus | 4, 5 |
| Probability and statistics | – |

Outcomes

The following outcomes, key knowledge and key skills are addressed through this task.

|  |
| --- |
| **Unit 2** |
| **Outcome** | **Key knowledge dot points** | **Key skills dot points** |
| 1 | 10, 11 | 9, 10 |
| 2 | 1, 2, 5 | 1, 2, 3, 5, 6 |
| 3 |  2, 3, 4 |  3, 5, 6, 7, 9, 12 |