

Unit 1 – Portfolio 1 – Optimizing Area and Perimeter

Problem

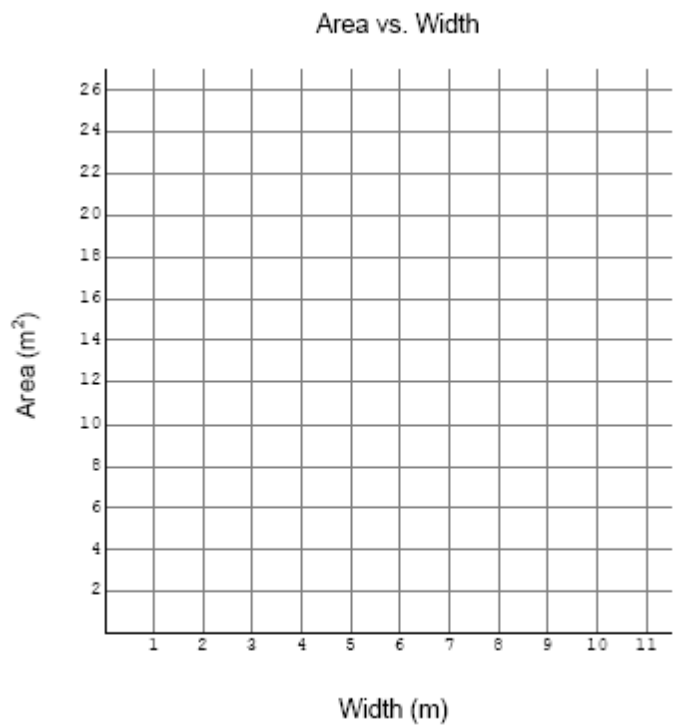
Your neighbour has asked for your advice about building his garden. He wants to fence the largest rectangular garden with 20 metres of fencing.

Clarify the Problem

What are you being asked to determine? What information is useful?

Model

Perimeter(m)	Width (m)	Length (m)	Area (m ²)
20 m	1 m	9 m	9 m ²
	2 m		



Manipulate

Look at the scatter plot. Circle the region on the scatter plot where the area of the garden is the largest.

Conclude

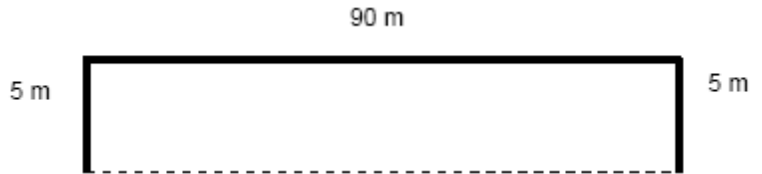
What are the best dimensions for the garden? Justify your choice. Include a sketch and the area of the garden that you are recommending.

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The city planners would like you to design a swimming area at a local beach. There is 100 m of rope available to enclose the swimming area. The shore will be one side of the swimming area; so only three sides of the rectangle will be roped off. It is your job to design the largest rectangular swimming area.

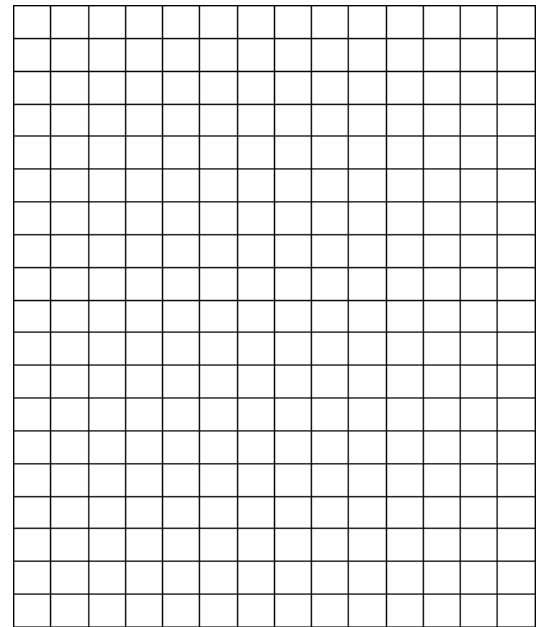
It is possible to build a long, narrow swimming area. Sketch three more swimming areas that have a larger area than this swimming area. Label the dimensions on the sketch and calculate the area, as shown above.



Model

Complete the table with possible combinations of width and length for the swimming pools. Calculate the area. Describe what happens to the area when the width of the swimming area increases. Construct a scatter plot of area vs. width. Choose appropriate scales.

Perimeter (m)	Width, w , (m)	Length, l , (m)	Area, A , (m^2) $l \times w$
100	0		
100	5		
100			
100			
100			
100			
100			
100			
100			



Conclude

Write a report to the town advising them of the dimensions that would be best for the new swimming area. Justify your choice. Include a sketch and the area of the swimming area that you are recommending.