

Unit 7: Optimization

Lesson 3: Maximum Area for a Given Perimeter



RECAP FROM LAST CLASS:

EX. 1. Your neighbour has asked for your advice about building his garden. He wants to fence the largest rectangular garden possible with _____ metres of fencing.

HYPOTHESIZE: *What do you think the largest rectangular garden will look like?*

DISCUSSION: What did we find last class?
Will this happen again? Was it a one me thing?

EX. 2. 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.

Clarify the Problem

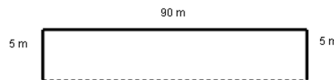
What are you being asked to determine?



What information is useful?

Explore

It is possible to build a long, narrow swimming area (such as the one below).



Calculate the area of this swimming area.

Sketch **three** more swimming areas that have a larger area than this swimming area.

- > Be sure to **label the dimensions** on the sketch and **calculate the area** for each of the three options.

Hypothesize

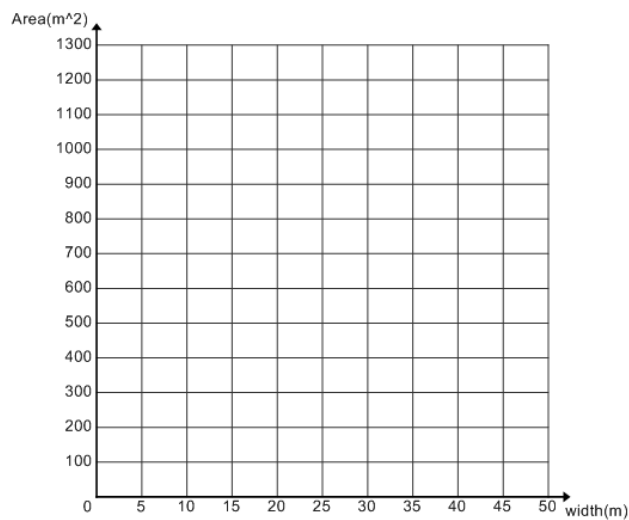
What do you think the dimensions of the largest swimming area will be?

Consider different combinations of width and length for the swimming area.
 Calculate the perimeter and area for each possibility.

Perimeter (m)	Width (m)	Length (m)	Area (m ²) l × w
100	5		
	10		

Analyze

Construct a scatter plot of Area vs. Width



Look at the scatter plot.

Circle the region on the scatter plot where the area of the swimming area is the largest.

Summarize (Conclusion)

What are the best dimensions for the new swimming area? Jusfy your choice.

Sketch the swimming area that you would recommend.

How does this compare to the best dimensions for a 4-sided swimming area?

4-sided:

3-sided: