

## RECAP:

### For a 4-sided figure:

Given perimeter:

maximum area =

\*\*\**side length* =

Given area:

minimum perimeter =

\*\*\**side length* =

### For a 3-sided figure:

Given perimeter:

maximum area =

*side length*:

\*\*\**length* =

\*\*\**width* =

## Unit 7: Optimization

### Lesson 5: Word Problems

**EX. 1.** The town planners have hired you to design a rectangular ice rink for the local park. They will provide you with 122 metres of fencing. They would like your design to enclose the greatest possible area for skaters.

a) What dimensions will result in the maximum area being enclosed?

b) What is the maximum area?

**EX. 2.** You want to construct a new chicken coop at the side of a barn. Since the barn will make one of the sides, you only need to fence off three sides of the coop. The chicken coop must have an area of 128 m<sup>2</sup>. A clever fox has been trying to get into the old coop and has caused a lot of damage. Since it is likely that you will be constantly repairing this coop you want to minimize its perimeter so you can save money.

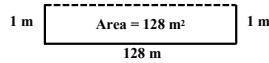
**Clarify the Problem**

What are you being asked to determine?

What information is useful?

**Explore**

It is possible to build a long, narrow chicken coop (see diagram).



Calculate the perimeter of this chicken coop.

Sketch **three** more chicken coops that have a smaller perimeter than this chicken coop.

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

Consider these different combinations of width and length for the chicken coop. Calculate the perimeter for each possibility.

Area, $A$ , (m <sup>2</sup> )	Width, $w$ , (m)	Length, $l$ , (m)	Perimeter (m) ( $P = l + 2w$ )
128	1	128	$128 + 2(1) = 130$
128	2	64	$64 + 2(2) = 68$
128	4		
128			
128			
128			
128			
128			
128			
128			
128			

What happens to the perimeter of the chicken coop as the width increases?

**Summarize (Conclusion)**

What dimensions would be the best for the chicken coop? Jusfy your choice.

Sketch the chicken coop that you would recommend.

**Apply**

If fencing costs \$2.49/m, what is the total cost of the fencing needed to build the chicken coop, including taxes of 13%?