Unit 7: Optimization

Lesson 4: Minimum Perimeter for a Given Area

QUESTION:
Michael has 16 square stones to arrange as a rectangular pao. He will then buy edging to go around the pao.

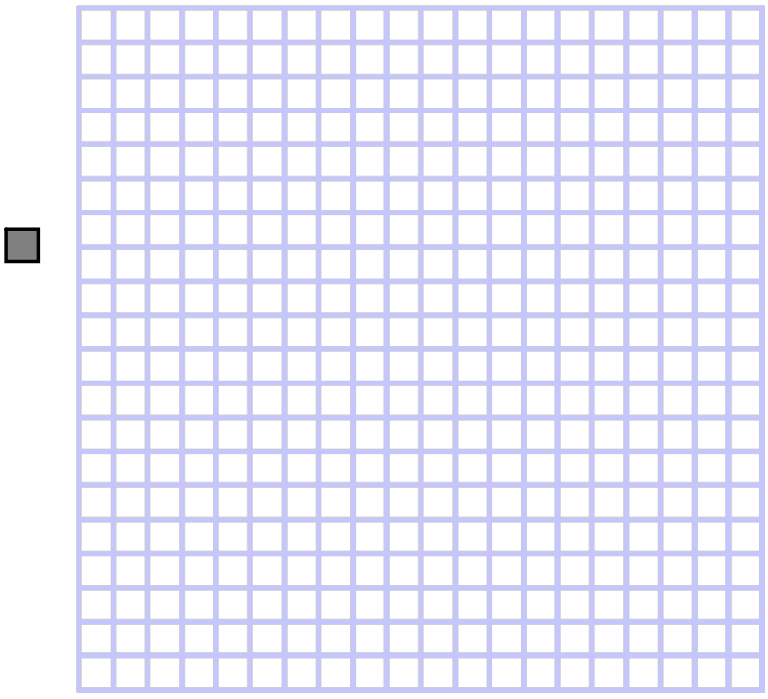
Clarify the Problem

What are you being asked to determine?

What informaon is useful?

Explore

1. Using the provided grid on your handout, shade in sets of 16 squares to illustrate all the different rectangular paos Michael could have.
2. Record the different dimensions in the table.



Complete the table with your findings.

Width	Length	Area	Perimeter

Which pao requires the least amount of edging?

Suppose each stone has a length of 30 cm. What is the least amount of edging needed for the pao? Jusfy your answer.

Conclusion

For a given area, the minimum perimeter occurs when the length and width are the _____ or when they are as _____ to equal in value as possible.

- The ideal shape is a _____ where side length =

Recall:

Area of square =

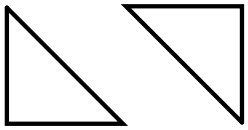
Perimeter of a square =

DEFINITION:

Congruent: Figures are *congruent* if they have the same size and shape.

***NOTE:** They do NOT have to have the same orientaon (i.e. they could be rotated).

EX. 1. You are given a number of congruent triangular stones. What arrangement would give the minimum perimeter?



a) 64 stones

b) 80 stones

EX. 2. What is the minimum perimeter for a rectangle with each area?

a) $29\ m^2$

b) $4\ cm^2$