

Optimizing Perimeter and Area Part 2

* Read questions carefully.

Some questions require the dimensions of the rectangles to be whole numbers, others allow decimal values. This will determine whether or not the rectangle with minimum perimeter is a square.

Example 1: Kevin wants to fence 24 m^2 of his backyard to make a rectangular vegetable garden. Determine the dimensions of the garden with the least perimeter. What is the least perimeter?

For least perimeter, we want to fence in a square. $A_{\text{square}} = x^2$

$$x^2 = 24$$

$$\text{So, } x = \sqrt{24}$$

$$x \doteq 4.9$$

$$P = 4x$$

$$P = 4(4.9)$$

$$P = 19.6$$

\therefore the garden should be $4.9 \text{ m} \times 4.9 \text{ m}$ with a minimum perimeter of 19.6 m .

Now, suppose the fencing comes in ..

2m sections that we cannot (or don't want to) cut. Given this constraint, what are the optimal dimensions?

Find the rectangle with even dimensions and an area of 24m^2 .

$$2 \times 12$$

$$4 \times 6$$

$$8 \times (3)_{\text{odd}}$$

← the rectangle closest to a square, satisfying the constraints has the minimum perimeter.

∴ the garden should be $4\text{m} \times 6\text{m}$ if using 2m fence pieces.

Page 44 #7-12, 14