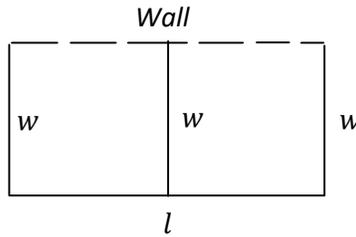


C11 - 3.7 - Fence w/ wall Split in Two

A rectangular fence that is split in half is against a wall. The total fencing length is 42 m. What is the max area of the fence?

Let $w = \text{width}$
Let $l = \text{length}$



Let statements:

$$F = l + 3w$$

$$A = l \times w$$

$$\text{max} = l \times w$$

$$y = l \times w$$

Equation 1, equation 2.
The minimum or maximum will be y .

$$P = l + 3w$$

$$42 = l + 3w$$

$$\begin{array}{r} -3w \quad -3w \\ \hline 42 - 3w = l \\ l = 42 - 3w \end{array}$$

Equation #1
Isolate a variable

$$A = l \times w$$

$$y = (42 - 3w) \times w$$

$$y = 42w - 3w^2$$

$$y = -3w^2 + 42w$$

$$y = -3(w^2 - 14w)$$

$$y = -3(w^2 - 14w + 49 - 49)$$

$$y = -3(w^2 - 14w + 49) + 147$$

$$y = -3(w - 7)^2 + 147$$

Equation #2
Substitute the isolated variable

Complete the square.

$$\left(\frac{b}{2}\right)^2 = \left(\frac{-14}{2}\right)^2 = (7)^2 = 49$$

$$l = 42 - 3w$$

$$l = 42 - 3(7)$$

$$l = 21$$

Vertex: (7,147)

The maximum is the y value.

length = 21m
width = 7m

Max area = 147 m²

List the length and width and the maximum area.