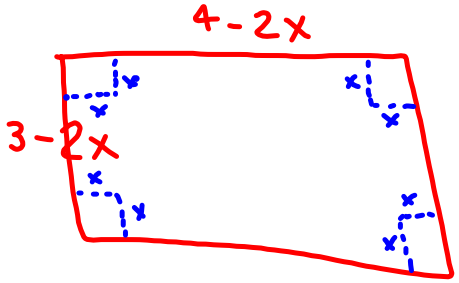
Max Value Example

A cardboard box that is 3 ft by 4 ft, will be cut and folded to create a box. Equal-size squares will be cut to make the fold.

What size squares should be cut to maximize volume? What is the maximum volume?



Volume = $l \cdot w \cdot h$

$(4-2x)(3-2x)(x)$

cubic

In calc find max (0.56, 3.03)

X = represents the size square being cut

0.56 ft

Y = max volume

3.03 ft^3

Formulas You Might Need

Perimeter ▭ $P = 2l + 2w$

Area ▭ $A = l \cdot w$

Distance $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Volume

▭ $V = l \cdot w \cdot h$

○ $V = b \cdot h$

$\pi r^2 \cdot h$

1) Find ℓ and w where $P = 80m$ and **max** area

$P = 2\ell + 2w$

$80 = 2\ell + 2w$

$\div 2$

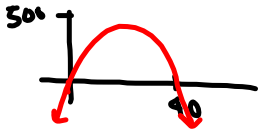
$40 = \ell + w$

$\ell = 40 - w$

$A = \ell \cdot w$

$A = (40 - w)(w)$ ← FOIL to find zeros

$A = 40w - w^2$



Max (w, A)

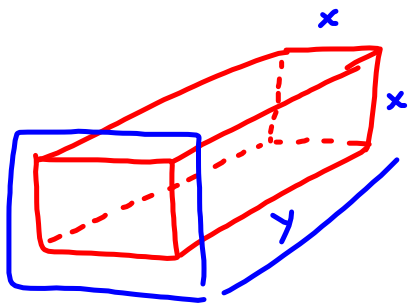
$(20, 400)$

width = 20 m

length = 20 m

Area $400m^2$

7)



girth = ℓ + Perimeter of base