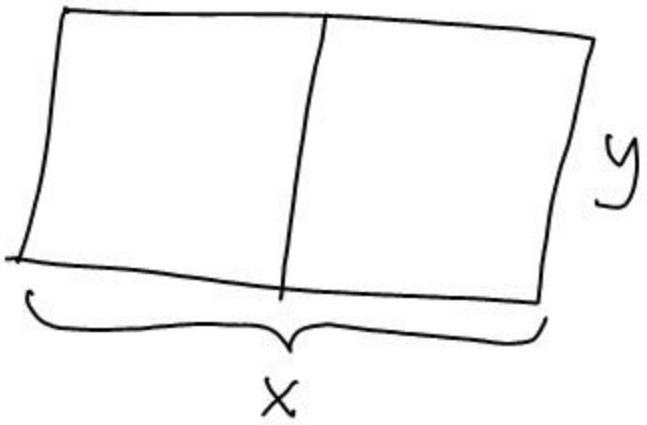
7X #3



400 ft of fence
Maximize area

$A = xy$ ← find the maximum

$2x + 3y = 400$

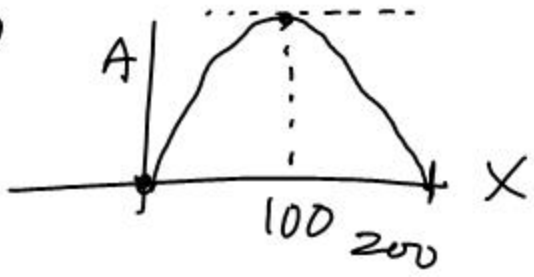
$3y = 400 - 2x$

$y = \frac{400 - 2x}{3}$

$A = x\left(\frac{400 - 2x}{3}\right)$

$A = \frac{400x - 2x^2}{3}$ ← find the max

$A' = \frac{400 - 4x}{3} = 0$



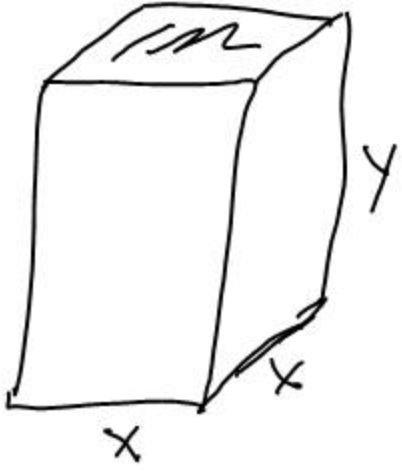
$\rightarrow 400 - 4x = 0$

$4x = 400$

$\boxed{x = 100 \text{ ft}}$

$y = \frac{400 - 2(100)}{3} = \underline{66.7 \text{ ft}}$

74 #1



$V = 32000\ cm^3$

Minimize surface area

$A = x^2 + 4xy$ ← where is this a minimum?

$x^2 y = 32000$

$y = \frac{32000}{x^2}$

$A = x^2 + 4x\left(\frac{32000}{x^2}\right)$

$A = x^2 + \frac{128000}{x}$ ← where is this a minimum?

$128000x^{-1}$

$-128000x^{-2}$

$A' = 2x - \frac{128000}{x^2} = 0$

mult both sides by x^2

$2x^3 - 128000 = 0$

$x^3 = 64000$

$x = 40\ cm$

$y = \frac{32000}{40^2}$

$\frac{32000}{1600}$

$y = 20\ cm$

74 $C(x) = x^3 - 3x^2 - 9x + 30$

$C'(x) = 3x^2 - 6x - 9 = 0$

$x^2 - 2x - 3 = 0$

$(x + 1)(x - 3) = 0$

~~$x = -1$~~, $x = 3$