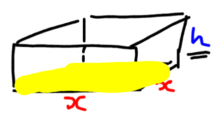
4.4 Applied Max & Min Problems

If 2700 cm^2 of cardboard is available to make a box with a SQUARE base & OPEN TOP, what is the max volume?



$V = x \cdot x h$

$= x^2 h$

$SA = x^2 + 4xh$

$2700 = x^2 + 4xh$

$h = \dfrac{2700 - x^2}{4x}$

$h > 0$

so $\dfrac{2700 - x^2}{4x} > 0$

$2700 - x^2 > 0$

$\sqrt{2700} > \sqrt{x^2}$

$51.96 > x$

$V = x^2 \cdot \left(\dfrac{2700 - x^2}{4x}\right)$

$V = \dfrac{2700x - x^3}{4} = 675x - \frac{1}{4}x^3$

$V = 675x - \frac{1}{4}x^3$

$V' = 675 - \frac{3}{4}x^2$

$675 - \frac{3}{4}x^2 = 0$

$-675 \qquad -675$

$-\frac{3}{4}x^2 = -675$

$x^2 = \dfrac{675 \cdot 4}{3}$

$x^2 = 900$

CP. $\longrightarrow x = 30$

$SA = 2700$

Evaluate at CP.

$V(30) = (30)(30)\left(\dfrac{2700 - 30^2}{4(30)}\right)$

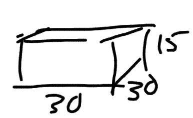
$2700 - (\sqrt{2700})^2$

$= 13500$ when $x = 30$cm

$V(0) = 0$

$V(51.96) = 0$

$\sqrt{2700}$



Find 2 numbers whose difference is 150. and whose product is a min!!

x and y

(1) $x - y = 150 \Rightarrow y = x - 150$

(2) $\underline{\underline{x \cdot y}} \leadsto$ min. value possible

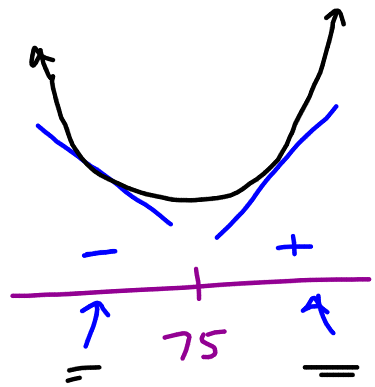
$P(x) = xy$

$P(x) = x(x-150)$

$P(x) = x^2 - 150x$

2(100)

$P' = 2x - 150$



$2x - 150 = 0$

$+150 \quad +150$

$2x = 150$

$x = 75$

so 75 is a min

4.4

Ch Review

$P(75) = x(x-150)$

$= 75(75-150)$

$= -5625$ min

when $x = 75$ and $y = \underline{\underline{-75}}$

since

$y = x - 150$

$y = 75 - 150 = \underline{\underline{-75}}$

Ch 4 Quiz
(instead of a test)
ON FRIDAY Apr. 19^{th}