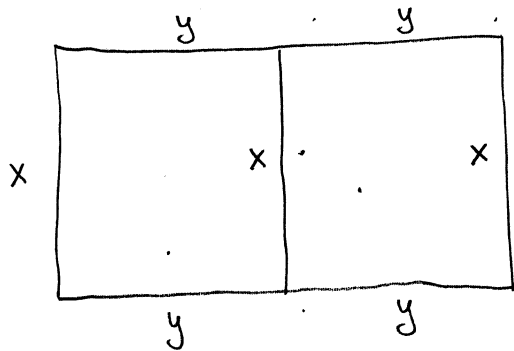


- Cindy wants to construct two side-by-side dog-training pens of the same size and sharing one common side. She has 400 ft of fencing material to use. What values of  $x$  and  $y$  maximize the combined areas of the pens?



$$3x + 4y = 400 \quad (\text{To use ALL THE FENCE.})$$

WE WANT TO FIND THE MAX AREA.

$$\text{Area} = 2xy = 2x \left( \frac{400 - 3x}{4} \right)$$

$$\begin{aligned} 3x + 4y &= 400 \\ 4y &= 400 - 3x \\ y &= \frac{400 - 3x}{4} \end{aligned}$$

$$A(x) = \frac{1}{2} x (400 - 3x)$$

$$A(x) = 200x - \frac{3}{2}x^2$$

THE GRAPH OF  $A(x)$  IS A PARABOLA THAT OPENS DOWNWARD. MAX VALUE OCCURS AT THE VERTEX.

$$x = \frac{-b}{2a} = \frac{-200}{2(-\frac{3}{2})} = \frac{200}{3}$$

TO MAXIMIZE AREA, USE

$$x = \frac{200}{3} \text{ FT AND } y = \frac{400 - 3(\frac{200}{3})}{4} = \frac{200}{4} = 50 \text{ FT.}$$