

Name: _____

Find the x -value that maximizes $f = xy$ given that $3x + 4y = 120$.

1) Given info

Maximize $f = xy$

Restriction: $3x + 4y = 120$

2) Single Variable

$$4y = 120 - 3x$$

$$y = 30 - \frac{3}{4}x \rightarrow f = xy$$

$$f = x(30 - \frac{3}{4}x)$$

$$f = 30x - \frac{3}{4}x^2$$

3) Set $f'(x) = 0$

$$f'(x) = 30 - \frac{6}{4}x$$

$$30 - \frac{3}{2}x = 0$$

$$30 = \frac{3}{2}x$$

$$20 = x$$

4) Answer

$$x = 20$$