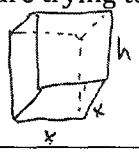
Name: Key Station Activity **Optimization: Station Activity** Date: _____

Station # 1 | We are trying to minimize/maximize surface area. (Circle min or max & fill in the blank)

Main equation (this is the equation we are trying to optimize):

$S = 2x^2 + 4xh$



Auxiliary equation (this comes from other information given in the problem):

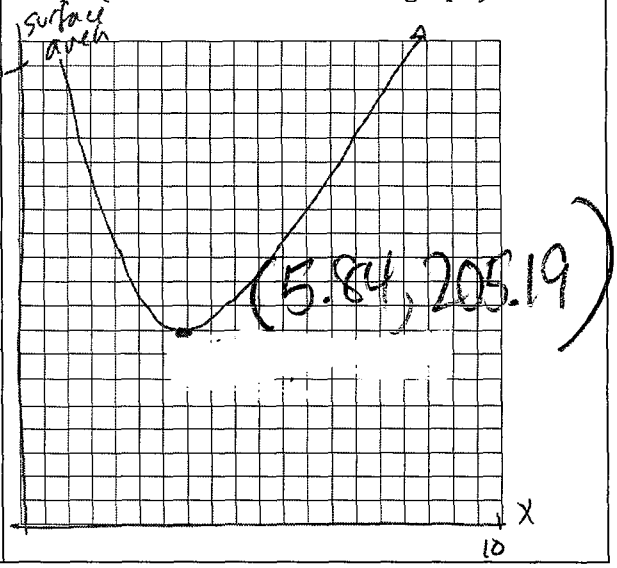
$V = x^2h \rightarrow 200 = x^2h$

Use the auxiliary equation to write your main equation with only two variables:

$h = \frac{200}{x^2}$

$S = 2x^2 + 4x\left(\frac{200}{x^2}\right) = 2x^2 + \frac{800}{x} = SA$

Graph (label axes and sketch a graph):



A suitable viewing window to see the min or max:
[xmin, xmax] = [0, 10]
[ymin, ymax] = [0, 250]

Answer to the original question:
min SA = 205.19

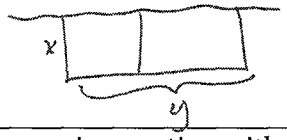
$h = \frac{200}{5.84^2} = 5.86$

dimensions:
$5.84 \times 5.84 \times 5.86$

Station # 2 | We are trying to minimize/maximize area. (Circle min or max & fill in the blank)

Main equation (this is the equation we are trying to optimize):

$A = xy$



Auxiliary equation (this comes from other information given in the problem):

$3x + y = 100$

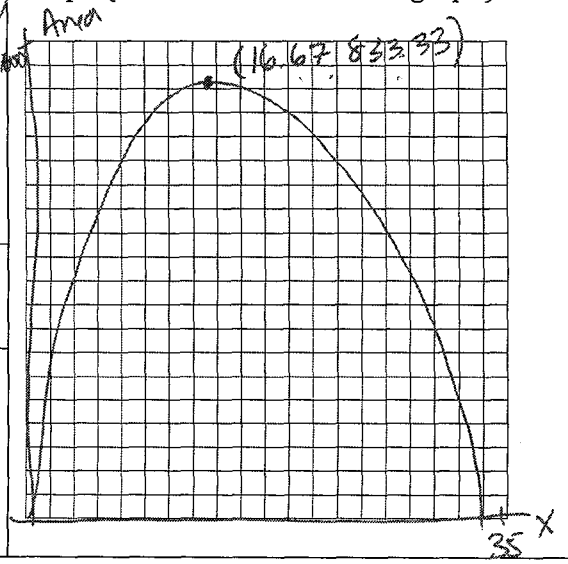
Use the auxiliary equation to write your main equation with only two variables:

$y = 100 - 3x$

$A = x(100 - 3x)$

$A = 100x - 3x^2$

Graph (label axes and sketch a graph):



A suitable viewing window to see the min or max:
[xmin, xmax] = [0, 36]
[ymin, ymax] = [0, 1000]

Answer to the original question:
Max area: $833.33\ ft^2$

Dimensions: $x = 16.67$

$y = 100 - 3(16.67) = 49.99$

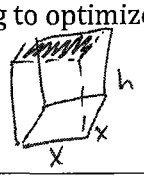
Name: _____ **Op nization: Station Activity** Date: _____

Station # 3

We are try g to minimize/maximize Volume.
(Circle mi r max & fill in the blank)

Main equation (this is the equation we e trying to optimize):

$V = x^2h$



Auxiliary equation (this comes from other information given in the problem):

$S = x^2 + 4xh$

$70 = x^2 + 4xh$

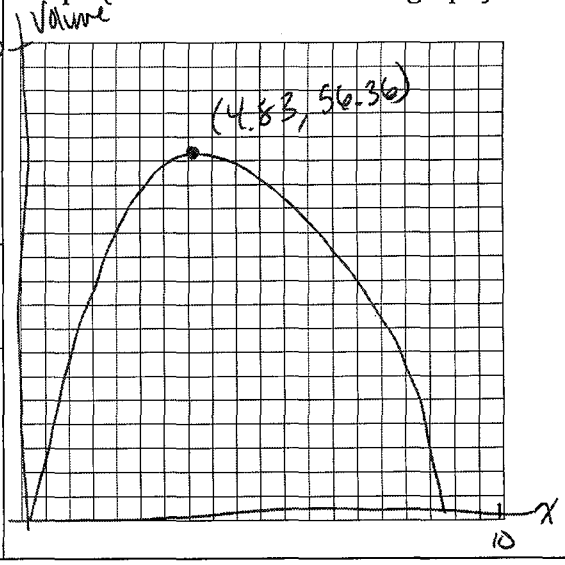
Use the auxiliary equation to write you main equation with only two variables:

$V = x^2h$

$V = x^2\left(\frac{70-x^2}{4x}\right) = \frac{70x - x^3}{4}$

$\frac{70-x^2}{4x} = h$

Graph (label axes and sketch a graph):



A suitable viewing window to see the n or max:
[xmin, xmax] = [0, 10]
[ymin, ymax] = [0, 80]

Answer to the original ~~question~~:
Max Volume: 56.36 ft³

Dimensions: $x = 4.83$

$h = \frac{70 - 4.83^2}{4(4.83)} = 2.42$

4.83 × 4.83 × 2.42

Station # 4

We are tr g to minimize/maximize volume.
(Circle mi or max & fill in the blank)

Main equation (this is the equation we e trying to optimize):

$V = x(16-2x)(10-2x)$

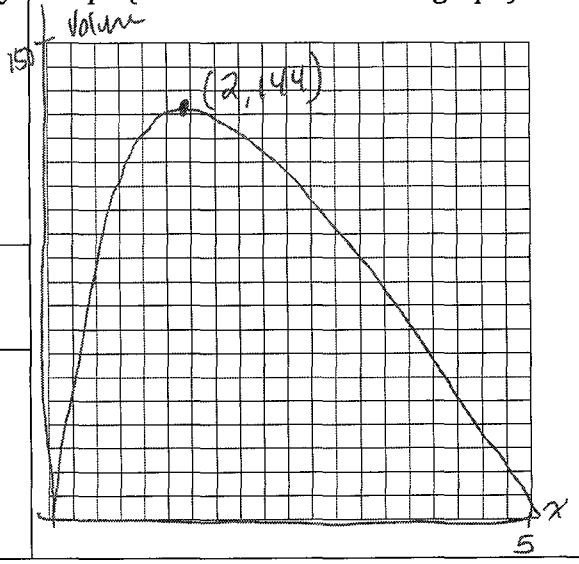
Auxiliary equation (this comes from other information given in the problem):

N/A

Use the auxiliary equation to write you main equation with only two variables:

$V = x(16-2x)(10-2x)$

Graph (label axes and sketch a graph):



A suitable viewing window to see the n or max:
[xmin, xmax] = [0, 5]
[ymin, ymax] = [0, 150]

Answer to the original ~~question~~:
Max Volume: 144 in³

I should cut 2 inches fro each corner.