10.3 #8

a) Trapezoidal Prism

Volume $= Bh$ in cm^3

$= \left[\frac{1}{2}(8+2)4\right]\left[10\right]$ cm^3

$= 200\ cm^3$

So, the volume of the prism is $200\ cm^3$

Surface Area $= 2B + (8\times 10) + (2\times 10) + 2(5\times 10)$ cm^2

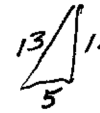
$= 40 + 80 + 20 + 100$ cm^2

$= 240\ cm^2$

So, the surface area of the prism is $240\ cm^2$

b) Square Pyramid

Volume $= \frac{1}{3}Bh$ cm^3 We find h using the Pythagorean Theorem.



$= \frac{1}{3}(10\times 10)(12)$ cm^3

$= 400\ cm^3$

So, the volume of the pyramid is $400\ cm^3$

Surface Area $= B + 4\left(\frac{1}{2}\times 10\times 13\right)$ cm^2

$= 100 + 260$ cm^2

$= 360\ cm^2$

So, the surface area of the pyramid is $360\ cm^2$

10.3
#32

Understand The Problem

I will consider making a box by cutting squares out of the four corners of a 16" x 16" piece of material, and the folding up the sides to form the box. As larger squares are cut out of the corners, the box will become taller but more narrow. I seek a box will whole number dimensions that has maximum volume.

Make A Plan

I will make a table and record the boxes' volumes as a function of the size of the square I cut out.

Carry Out the Plan

Size of Square (in)	Dimensions of box (in)	Volume of box (in^3)
1x1	14x14x1	196 in^3
2x2	12x12x2	288 in^3
3x3	10x10x3	300 in^3
4x4	8x8x4	256 in^3
5x5	6x6x5	180 in^3

So the box of greatest volume will have dimensions 10"x10"x3".

Look Back

This method allowed me to answer the question posed by this problem.

Activity Set 10.3

#5

b) The completed table is shown below. Base areas were computed using the formula $A = \pi r^2$; Volumes were computed using the formula $V = \frac{1}{3} Bh$.

Cone #	1	2	3	4	5	6
Central Angle	45°	90°	135°	225°	270°	315°
Radius (cm) of base	1.25	2.50	3.75	6.25	7.50	8.75
Base Area (cm^2)	4.91	19.63	44.16	122.66	176.63	240.41
Height (cm) of cone	9.92	9.68	9.27	7.81	6.61	4.84
Volume (cm^3) of cone	16.22	63.32	136.44	319.32	389.16	387.86

c) For central angles of decreasing size from 45° down, the volume decreases. As central angles increase in size from 315° up, the volume also decreases. I think the maximum volume occurs for a central angle between 270° and 315°.