Geometry (H)
Section – Problems

Slant height ≠ lateral edge — Notes

1. Find the LA, TA and V of each pyramid described.

a. A regular triangular pyramid with base edge 4 and slant height 6.

$LA = \frac{1}{2}pl = \frac{1}{2}(12)6 = 36$

$h = 2\sqrt{3}$ of base

$TA = LA + B = 36 + \frac{1}{2}bh$, $\frac{1}{2}(4)(2\sqrt{3})$, $= \boxed{36 + 4\sqrt{3}}$

$V = \frac{1}{3}Bh = \frac{1}{3}(4\sqrt{3})\left(\frac{\sqrt{104}}{\sqrt{3}}\right) = \frac{4}{3}\sqrt{104} = \frac{4}{3}(2)\sqrt{26} = \boxed{\frac{8\sqrt{26}}{3}}$

$\frac{2\sqrt{3}}{3}$, a, 2

b. A regular square pyramid with base edge 12 and lateral edge 10.

$B = 144$, $l = ?$ face

$LA = \frac{1}{2}pl = \frac{1}{2}(48)8 = \boxed{192}$

l, 10, 6, $l = 8$

$TA = LA + B = 192 + 144 = \boxed{336}$

$V = \frac{1}{3}Bh = \frac{1}{3}(144)2\sqrt{7} = 48(2\sqrt{7}) = \boxed{96\sqrt{7}}$

$h = ?$, h, $l = 8$, $a = 6$, Base, a, 6, $6^2 + h^2 = \ldots$, $h = \sqrt{28}$, $h = 2\sqrt{7}$

2. A regular octagonal pyramid has base edge 3 m and lateral area 60 m^2. Find its slant height. (l)

$B = \frac{1}{2}ap = \frac{1}{2}(3.6213)(24) = 43.4558$

$LA = \frac{1}{2}pl$, $60 = \frac{1}{2}(24)l$, $5 = l$ *

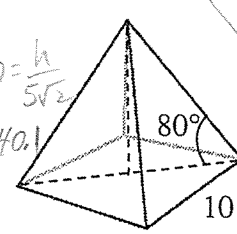
$TA = LA + B = 60 + 43.4558$, $\boxed{TA = 103.4558}$

$V = \frac{1}{3}Bh \to h$, $= \frac{1}{3}(43.4558)h$, $\boxed{V = 329.5}$

a, $22\frac{1}{2}$, 1.5; $\tan 22\frac{1}{2} = \frac{1.5}{a}$, $a \approx 3.6213$

h, 5, 1.5; $h = 25 - 1.5^2$, $h = 22.75$

3. Find the volume of the regular square pyramid. Round the answer to the nearest tenth.



$B = 10^2 = 100$

$V = \frac{1}{3}Bh = \frac{1}{3}(100)(40.1) \approx 1336.\overline{66} \to \boxed{1336.7}$

Need radius

Base: 45, 45, 5, 5, $5\sqrt{2}$

$\tan 80 = \frac{h}{5\sqrt{2}}$, $h \approx 40.1$, h, 80, $5\sqrt{2}$

4. The base of a pyramid is a regular hexagon with sides y cm long. The lateral edges are $2y$ cm long. Find the volume of the pyramid in terms of y.

$a = \frac{1}{2}y\sqrt{3}$

y, 30, 60, y, $\frac{1}{2}y$, $2y$

$6y$ = perimeter

$\frac{y\sqrt{3}}{2}$ = apothem

y = radius

$B = \frac{1}{2}\frac{y\sqrt{3}}{2}6y$

$B = \frac{3y^2\sqrt{3}}{2}$

Figure you need

$V = \frac{1}{3}Bh$, $B = \frac{1}{2}ap$, apothem

Find h

h, $2y$, y

$h^2 + y^2 = (2y)^2$

$h^2 = 4y^2 - y^2$

$h^2 = 3y^2$

$h = y\sqrt{3}$

$V = \frac{1}{3}\frac{3y^2\sqrt{3}}{2}y\sqrt{3}$

$= \boxed{\frac{3y^3}{2}}$

$LA = \pi r l$

$TA = LA + B \leftarrow B = \pi r^2$

$V = \frac{1}{3} B h$

Geometry (H)
Section – Cones

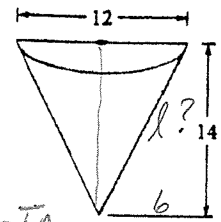
$A_\Delta = \frac{1}{2}(12)(14) = 84$

1. Find the volume and the total area of the semicircular cone.

$TA = LA + B$
$= \pi r l + \pi r^2$
$= 6\pi(2\sqrt{58}) + \pi 36$
$\frac{1}{2}(12\pi\sqrt{58} + 36\pi) \to \boxed{6\pi\sqrt{58} + 18\pi + 84} = TA$

$V = \frac{1}{3} B h$
$= \frac{1}{3} 36\pi (14)\left(\frac{1}{2}\right)$
$= \boxed{84\pi}$

$r=6$



$6^2 + 14^2 = l^2$
$232 = l^2$
$2\sqrt{58} = l$

2. Find the volume remaining if the smaller cone is removed from the larger.

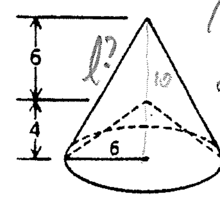
$V_{remain} = V_{LG} - V_{sm}$

$V_{sm} = \frac{1}{3} B h$
$= \frac{1}{3}\pi 6^2(4)$
$= 48\pi$

$V_{LG} = \frac{1}{3} 36\pi (10)$
$= 120\pi$

$120\pi - 48\pi = V_{remain}$
$\boxed{72\pi} = V$

not needed
$6^2 + 10^2 = l^2$
$136 = l^2$
$2\sqrt{34} = l$

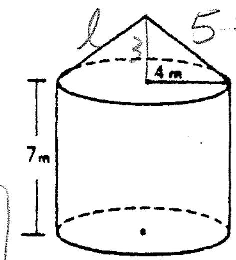


3. The total height of the tower shown is 10 m. If one liter of paint will cover an area of 10 m^2, how many 1 liter cans of paint are needed to paint the entire tower?

$TA_{tower} = LA_{cyl} + B_{cyl} + LA_{cone}$
$= 2\pi r h + \pi r^2 + \pi r l$
$= 8\pi(7) + \pi 16 + \pi 4(5)$
$= \boxed{92\pi \text{ sq.}}$

$\frac{92(3.14)}{10} = \approx \frac{28.9}{10} \approx \boxed{29 \text{ Cans}}$

$5 = l$

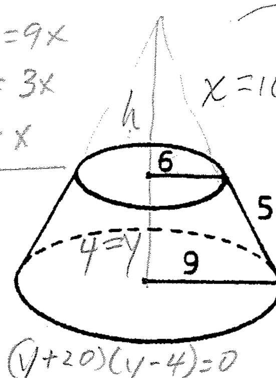


4. Find the volume and total area of the truncated cone.

$TA_{truncated} = TA_w - TA_{cut} + B_w + B_{cut}$
$= \pi 9(15) - \pi 6(10) + \pi 9^2 + \pi 6^2$
$= 75\pi + 117\pi = \boxed{192\pi}$

$\frac{6}{9} = \frac{x}{x+5}$
$6x + 30 = 9x$
$30 = 3x$
$10 = x$

$x = 10$ $\quad l = 15$



$V_{trunc.} = V_w - V_{cut}$
$= \frac{1}{3} 81\pi(12) - \frac{1}{3} 36\pi(8)$
$= 324\pi - 96\pi = \boxed{228\pi \text{ cubic}}$

$h_{cut} = 8$
$h_w = 12$

$(y+20)(y-4) = 0$
-20 omit $\quad y = 4$

$9^2 + (8+y)^2 = 15^2$
$y^2 + 16y + 64 = 144$