Slant height ≠ lateral edge   Notes

Geometry (H)
Section 12.1 & 12.3 – Problems

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.

$B = 144$
$LA = \frac{1}{2}pl$
$= \frac{1}{2}(48)(10)$
$= \boxed{240}$

$TA = LA + B$
$= 240 + 144$
$= \boxed{384}$

$V = \frac{1}{3}Bh$
$= \frac{1}{3}(144)8$
$= 48(8)$
$= \boxed{384}$

$h = 8$, 10, 6

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

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

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

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

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

$h^2 = 25 - 1.5^2$
$h = 22.75$

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

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

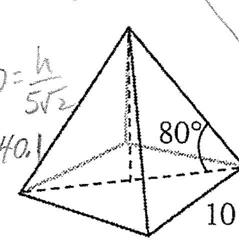
$B = 10^2 = 100$
$V = \frac{1}{3}Bh$
$= \frac{1}{3}(100)(40.1)$
$\approx 1336.\overline{66} \rightarrow \boxed{1336.7}$

Need radius

Base

$5\sqrt{2}$

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



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.

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

$6y$ = 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

Find h

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

$h^2 + y^2 = (2y)^2$
$h^2 = 4y^2 - y^2$

$h = y\sqrt{3}$

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

$LA = \pi r l$

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

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

Geometry (H)
Section 12.3 – Cones

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

$TA = LA + B$

$= \pi r l + \pi r^2$

$= 6\pi(2\sqrt{58}) + \pi 36$

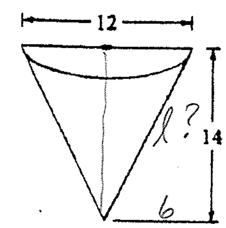
$= \boxed{12\pi\sqrt{58} + 36\pi}$

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

$= \frac{1}{3} 36\pi(14)$

$= \boxed{168\pi}$

$r = 6$



$6^2 + 14^2 = l^2$

$232 = l^2$

$2\sqrt{58} = l$

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

$V_{remain} = V_{LG} - V_{sm}$ | $V_{sm} = \frac{1}{3} B h$

$= \frac{1}{3}\pi 6^2(4)$

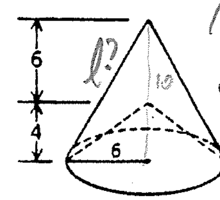
$= 48\pi$

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

$= 120\pi$

$120\pi - 48\pi = V_{remain}$

$\boxed{72\pi} = V$



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?

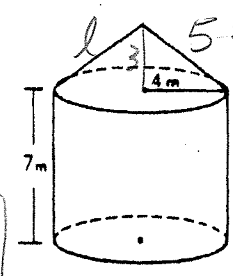
$TA_{tower} = LA_{cyl} + B_{cyl} + LA_{cone}$

$= 2\pi r h + \pi r^2 + \pi r l$

$= 8\pi(7) + \pi 16 + \pi 4(5)$

$= \boxed{92\pi \text{ sq.}}$

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



$5 = l$

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

$TA_{truncated} = TA_W - TA_{cut} + B_W + B_{cut}$

$= \pi 9(15) - \pi 6(10) + \pi 9^2 + \pi 6^2$

$= 75\pi + 117\pi = \boxed{192\pi}$

$\frac{6}{9} = \frac{x}{x+5}$

$6x + 30 = 9x$

$30 = 3x$

$10 = x$

$x = 10$

$l = 15$

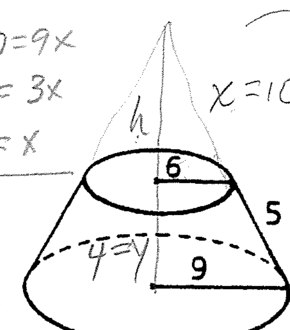
$V_{trunc.} = V_W - V_{cut}$

$= \frac{1}{3} 81\pi(12) - \frac{1}{3} 36\pi(8)$

$= 324\pi - 96\pi = \boxed{228\pi \text{ cubic}}$

$h_{cut} = 8$

$h_W = 12$



$(y+20)(y-4) = 0$

-20 $y = 4$

$9^2 + (8+y)^2 = 15^2$

$y^2 + 16y + 64 = 144$