Geometry (H)
Warm up – Pyramids

Name: KEY

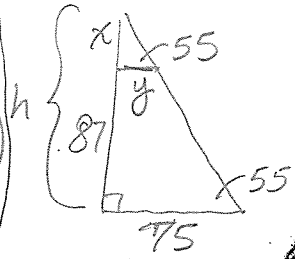
Suppose a regular pyramid has a square base with a 150 ft base edge. It is 87 ft tall and the angle of the slant is 55°. Find the total area and volume of the pyramid. Round your answer to the nearest tenth. → use trig.

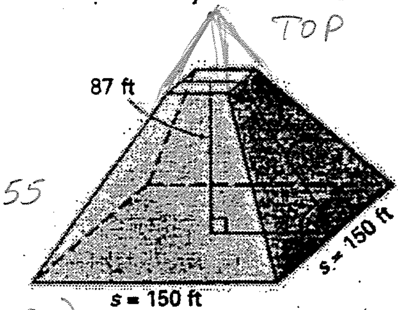
$V = V_{wh} - V_{TOP}$

$\frac{1}{3}(150)^2(75\tan 55) - \frac{1}{3}(28.16)^2(75\tan 55 - 87)$

$803{,}333.2538 - 5315.9377$

$\boxed{V = 798{,}017.3 \text{ cu. ft.}}$





$h \rightarrow$ $\tan 55 = \frac{(x+87)}{75}$

$75\tan 55 = \underbrace{x+87}$

$75\tan 55 = h$

$(75\tan 55) - 87 = x$

$20.1111 \approx x$

$\tan 55 = \frac{20.1111}{y}$

$y = \frac{20.1111}{\tan 55}$

$y \approx 14.0819$

$e = 2y \approx 28.16$

$TA = \underset{(LA+B)}{TA_{whole}} - \underset{(LA)}{TA_{TOP}} + B_{TOP}$

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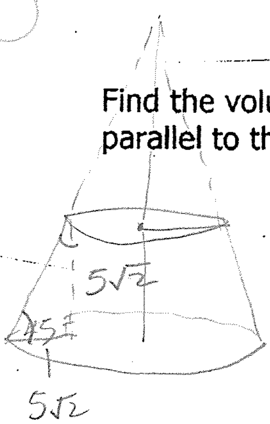
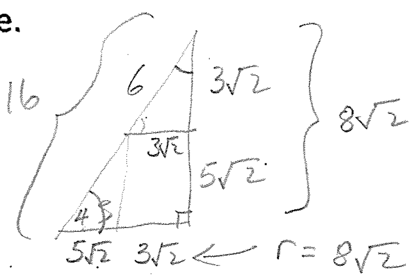
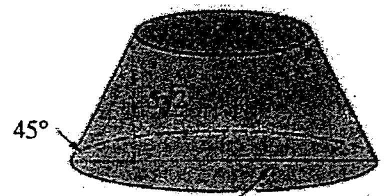
Find the volume and the total area of this solid formed by truncating a cone with a plane parallel to the base.





$8\sqrt{2} = h$

$r = 8\sqrt{2}$



$8\sqrt{2}$ = radius

$V_{whole} = \frac{1}{3}Bh$

$\frac{1}{3}(\pi(8\sqrt{2})^2)(8\sqrt{2})$

$= \frac{1024\pi\sqrt{2}}{3}$

$V_{TOP} = \frac{1}{3}\pi(3\sqrt{2})^2(3\sqrt{2})$

$6\pi(3\sqrt{2})$

$18\pi\sqrt{2}$

$\boxed{V = \frac{970\pi\sqrt{2}}{3}}$

$TA = (LA_{whole} - LA_{TOP}) + A_{TOP} + A_{BOTTOM}$

$= \pi r l - \pi r_{TOP} l + \pi r_{TOP}^2 + \pi r^2$

$= \pi(8\sqrt{2})(16) - \pi(3\sqrt{2})(6) + \pi(3\sqrt{2})^2 + \pi(8\sqrt{2})^2$

$= 128\pi\sqrt{2} - 18\pi\sqrt{2} + 18\pi + 128\pi$

$\boxed{TA = 110\pi\sqrt{2} + 146\pi}$

Pyramid

$$TA = TA_{whole} - TA_{TOP} + B_{TOP}$$

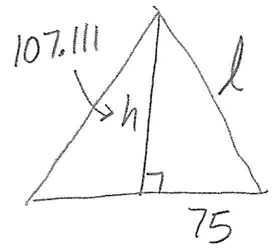
$$\quad\; LA + B_{BOTTOM} \quad\; LA \quad + \; B_{TOP}$$

$$\tfrac{1}{2}pl + e^2 - \tfrac{1}{2}pl + e^2$$

$$= \tfrac{1}{2}(600)(130.759) + 22{,}500 - \tfrac{1}{2}(112.6556)(24.5511) + 28.16^2$$

$$\boxed{TA = 61{,}137.78}$$

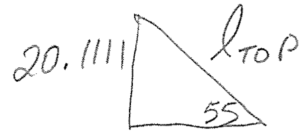
Slant ht



$$(107.111)^2 + 75^2 = l^2$$

$$130.759 = l$$

TOP Pyramid sl. ht.



$$\sin 55 = \frac{20.1111}{l}$$

$$l \approx 24.5511$$

You can also find TA by finding Area of a trapezoid times 4 and add the 2 bases.