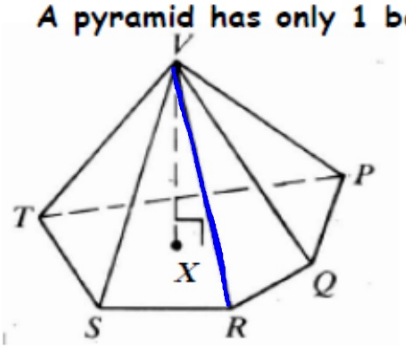
12-2 Pyramids

Date March 23

A pyramid has only 1 base, and the lateral faces are triangles.



V is the vertex of the pyramid.

The base is pentagon PQRST.

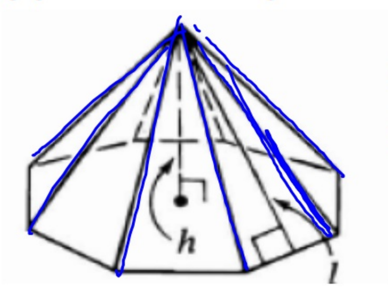
The triangular lateral faces intersect along the lateral edges, $\overline{VR}$, $\overline{VQ}$, $\overline{VS}$, $\overline{VT}$, $\overline{VP}$.

The altitude or height of the pyramid is $\overline{VX}$.

In a regular pyramid,

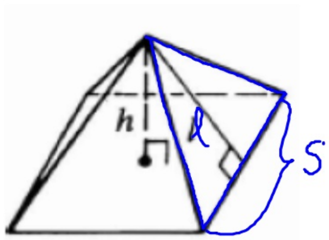
(1) the base is a regular polygon with all sides = + all interior ∠s =.

(2) the altitude (h) meets the base at its center



(3) all lateral edges are =

(4) all lateral faces are congruent isosceles triangles with slant height (l)



regular square pyramid

The lateral area of a regular pyramid is the sum of the areas of the triangular faces.

$$LA = 4\Delta s = 4\left(\frac{1}{2}s\ell\right) = \frac{1}{2}(4s)\ell$$

$$\frac{1}{2}(\text{base perimeter})\left(\begin{matrix}\text{slant}\\ \text{ht}\end{matrix}\right)$$

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Lateral Area of a Regular Pyramid $LA = \frac{1}{2}p\ell$

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Total Area of a Regular Pyramid $TA = LA + B$

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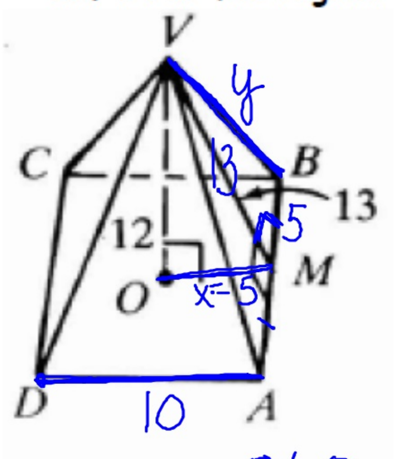
Volume of any Pyramid

$$V = \frac{1}{3}Bh$$

Ex. 1 **For the regular square pyramid shown, find each measurement.**



OM 5

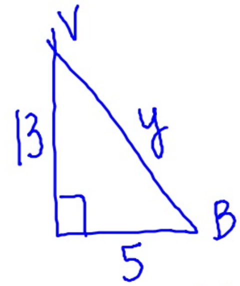
$x^2 + 12^2 = 13^2$

AD 10

lateral edge *VB* $\sqrt{194}$

$5^2 + 13^2 = y^2$

$25 + 169$



lateral area 260

$\frac{1}{2} p\ell$

$\frac{1}{2}(40)(13)$

total area 360

LA + B

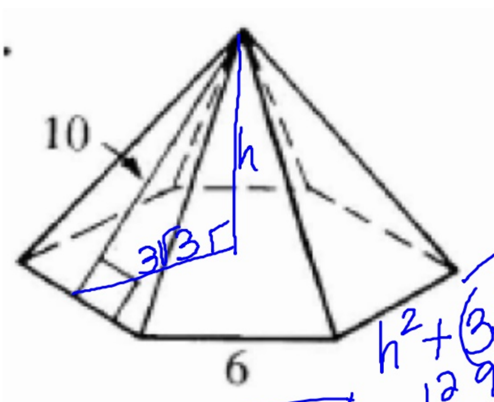
260 + 100

Volume 400

$\frac{1}{3} Bh$

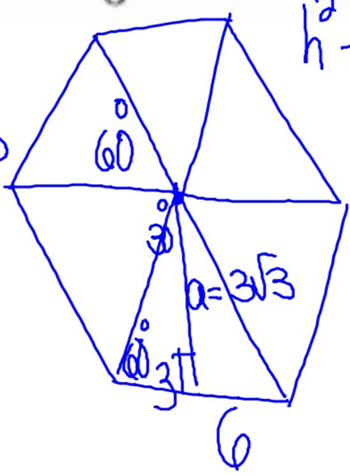
$\frac{1}{3} 100 \cdot 12$

Ex. 2 **For the regular pyramid shown, find lateral area, total area, and volume.**



$\frac{1}{2}pa$

$\frac{1}{2} \cdot 36 \cdot 3\sqrt{3}$



$h^2 + (3\sqrt{3})^2 = 10^2$

$9 \cdot 3$

$h^2 + 27 = 100$

$\sqrt{h^2} = \sqrt{73}$

$h = \sqrt{73}$

$LA = \frac{1}{2}pl = 180$

$\frac{1}{2}(36)10$

$TA = 180 + 54\sqrt{3}$

$V = \frac{1}{3}Bh = \frac{1}{3}(54\sqrt{3})(\sqrt{73})$

$18\sqrt{219}$