Tuesday, May 26, 2020

Sec 11-3: Surface Area of Pyramids

Remember that a Prism is

a 3-D figure with two congruent
Polygons in opposite faces (Bases)

Pyramid

- Polyhedron with only one Base that is a polygon.
- Lateral Faces are triangles.
- Lateral Faces meet at a point called the Vertex of the Pyramid.

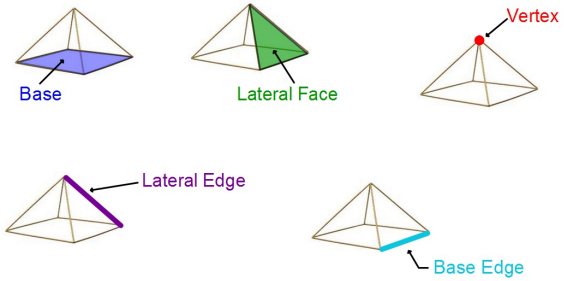
Base

Lateral Face

Vertex

Lateral Edge

Base Edge



Regular Pyramid:

- Base is a Regular Polygon
- Lateral Faces are Isosceles Triangles.

Names for Pyramids:

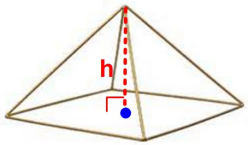
Just like Prisms, Pyramids are named using the shape of the base.

The Pyramid at the left would be called a Square Pyramid if the base is a square.

h

Height of the Pyramid (Altitude)

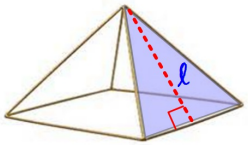
Perpendicular segment from the Vertex to the Base



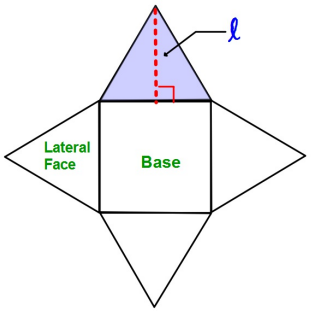
ℓ

Slant Height

Perpendicular segment from the Vertex to a Base Edge.



If you flattened out a square pyramid it would look like this:



The slant height is just the height of the triangular lateral faces.

Surface Area of a Pyramid:

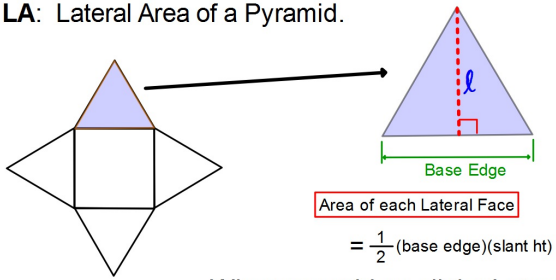
$$SA = LA + B$$

LA = Lateral Area of the Pyramid

B = Area of the Base of the Pyramid

B: the formula for the area of the Base will depend on the shape of the Base.

LA: Lateral Area of a Pyramid.



Area of each Lateral Face

$= \frac{1}{2}$(base edge)(slant ht)

When you add up all the Lateral Faces you get the following Formula:

Lateral Area of a Pyramid:

$$LA = \frac{1}{2}(p)(\ell)$$

p = perimeter of the Base

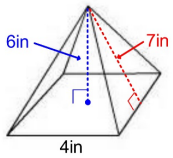
ℓ = slant height

Surface Area of a Pyramid:

$$SA = LA + B$$

$$SA = \frac{1}{2}(p)(\ell) + B$$

Find the Surface Area of this Square Pyramid.



4 in = length of Base Edge

6 in = Height of Pyramid (altitude)

7 in = Slant Height

B = (4in)(4in) or $(4in)^2$ = $16\ in^2$

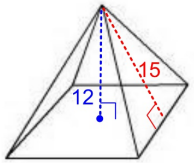
LA = $\frac{1}{2}(p)(\ell)$ p = 4(4 in) = 16 in.

ℓ = 7 in.

= $\frac{1}{2}(16in)(7in)$ = $56\ in^2$

SA = 56 + 16 = $72\ in^2$

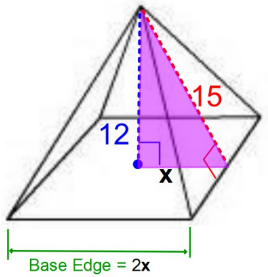
Find the SA of this Square Pyramid.

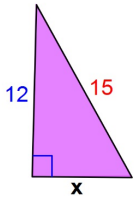


12 = Height of the Pyramid

15 = Slant Height

We need to find the length of a Base Edge.





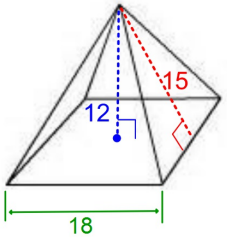
$x^2 + 12^2 = 15^2$

$\sqrt{x^2} = \sqrt{15^2 - 12^2}$

$\boxed{x = 9}$

Base Edge = $2x$

Base Edge = 18



SA = LA + B

$B = (18)^2 = \boxed{324}$

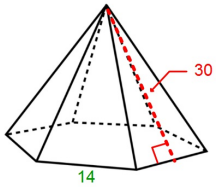
$LA = \frac{1}{2}(p)(\ell)$ $\quad p = 4(18) = 72$, $\ell = 15$

$= \frac{1}{2}(72)(15)$

$\boxed{LA = 540}$

$SA = 540 + 324 = \boxed{864}$

Find the SA of this Pyramid whose Base is a Regular Hexagon.



14 = Base Edge

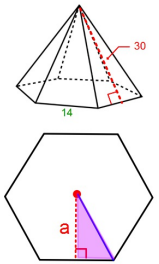
30 = Slant Height

$LA = \frac{1}{2}(p)(\ell)$ $\quad p = 6(14) = 84$, $\ell = 30$

$= \frac{1}{2}(84)(30)$

$\boxed{LA = 1260}$

Now let's find **B**

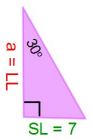


Since **B** is the area of a Regular Hexagon use the following formula:

$B = \frac{1}{2}(a)(p)$

p = 84 from previous work

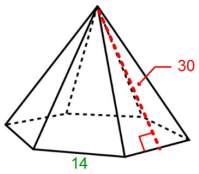
a = the apothem



$\boxed{a = 7\sqrt{3}}$

$B = \frac{1}{2}(7\sqrt{3})(84)$

$\boxed{B = 294\sqrt{3}}$



SA = LA + B

= 1260 + $294\sqrt{3}$

SA = 1769.22

You can now do the first few problems of Practice #26.

We'll continue with this material tomorrow

Due date for this practice is still to be determined.