12 - 5 Surface Area of Pyramids

Pyramids:

* Lateral faces (faces that are not the base) intersect at one point, the **vertex**.

* The lateral faces are the triangles.

* The base will be a polygon.

* Lateral edges are the edges that connect the base to the vertex.

* The altitude (height) is the perpendicular segment that goes from the vertex to the base.

Regular Pyramid:

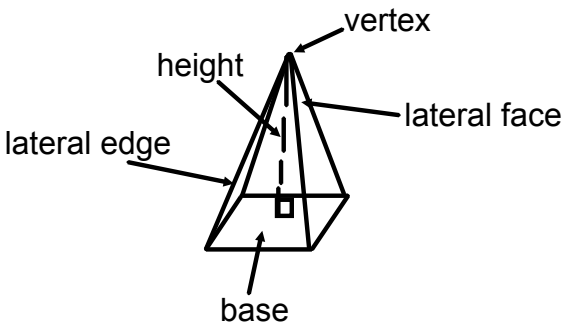
* When the base is a regular polygon and the altitude is perpendicular going through the center of the base.

* Lateral faces will be congruent isosceles triangles.

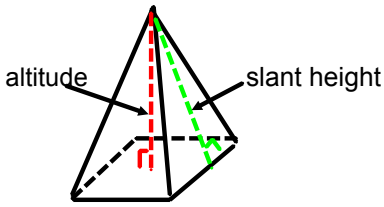
Slant Height:

* The height of the lateral faces.
* indicated by l.

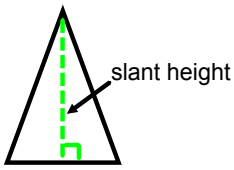
Square Pyramid



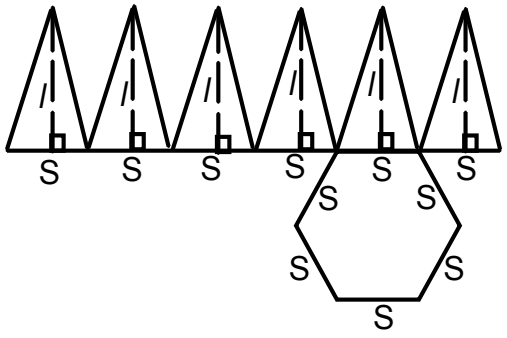
Regular Square Pyramid



Slant height: the height of each lateral face



Nets will help us find the lateral area as well as the surface area.



Lateral Area (L. or L.A.) would be found by finding the area of the triangles and adding them together.

$$\text{L.A.} = \frac{1}{2} P l$$

l = slant height

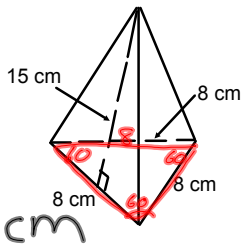
P = perimeter of base

Surface Area (T. or S.A.) would be found by finding the lateral area and adding the area of the base.

$$S.A. = \frac{1}{2}P\ell + B$$

ℓ = slant height
P = perimeter of base
B = Area of Base

1. Find the L.A. and the S.A. for the pyramid shown.



$LA = \frac{1}{2}P\ell$

$P = 8 + 8 + 8 = 24\text{ cm}$

$\ell = 15\text{ cm}$

$LA = (\frac{1}{2})(24)15$

180 cm^2

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

$LA + B$

$B = bh$

$8 \cdot 15$

120

$A = \frac{1}{2}ab\sin C$

$A = \frac{1}{2}(8)(8)\sin 60$

$A = 32\sin 60$

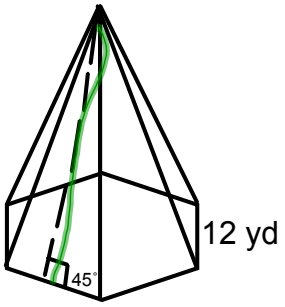
$A = 27.7128$

$SA = L.A. + B$

$S.A. = 180 + 27.7128$

$S.A. = 207.7\text{ cm}^2$

2. Find the lateral area of the regular hexagonal pyramid.



$L.A. = (1/2)P \cdot \ell$

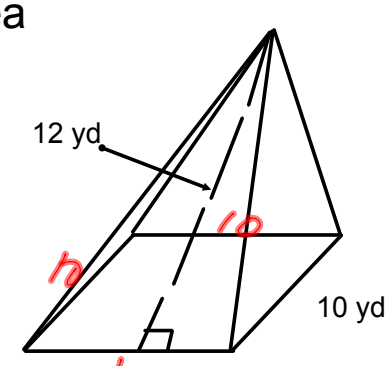
$P = 12 \cdot 6 = 72$

$\ell = 6$

$L.A. = (1/2)72 \cdot 6$

$= 216 yd^2$

3. Find the surface area of the square pyramid.



$S.A. = L.A. + B$

$L.A. = \frac{1}{2} P \ell$

$P = 10+10+10+10 = 40$

$\ell = 12$

$L.A. = \frac{1}{2}(40)(12)$

$L.A. = 240\ yd^2$

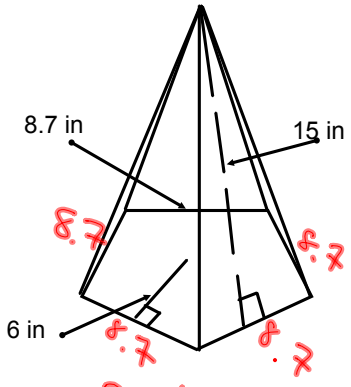
$B = 10(10)$

$B = 100$

$S.A. = 240 + 100$

$S.A. = 340\ yd^2$

4. Find the surface area of the regular pentagonal pyramid shown.



$S.A. = L.A. + B$

$L.A. = \frac{1}{2}pl$

$P = (8.7)5 = 43.5$

$l = 15$

$L.A. = \frac{1}{2}(43.5)(15)$

$L.A. = 326.25\ in^2$

$B = \frac{1}{2}Pa$

$P = 8.7(5) = 43.5$

$a = 6$

$B = \frac{1}{2}(43.5)(6)$

$B = 130.5$

$S.A. = L.A. + B$

$S.A. = 326.25 + 130.5$

$S.A. = 456.75\ in^2$