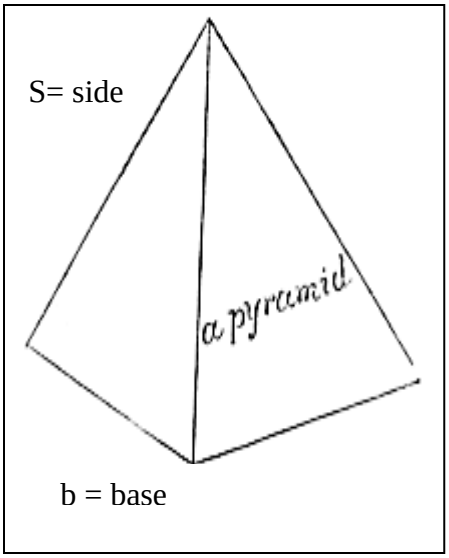
**Lesson 16: Surface Area of Pyramids**




*A pyramid is a solid whose base is a plane figure, and whose sides are triangles uniting at a common point, called the vertex. If a straight line be drawn on one of the sides of a pyramid from the vertex...*

The surface area of a pyramid is not difficult since you already know about areas of two dimensional figures. That is, you know how to find the area of a triangle, which makes up the sides (or laterals) of a pyramid.

The Surface Area is calculated from two parts: the area of the sides of the pyramid, called the **Lateral Area**, and the area of the base called the **Base Area**.

The **Base Area** depends on the shape, there are different formulas for each base, such as a triangle, square, or other shapes. This means you use the surface area formula <u>*depending on the shape of the base*</u>. The number of sides of the pyramid tells you what shape the base is, and therefore which formula you use to determine the base area.

For example, if the pyramid has four sides, and the base of each of the triangles of the pyramid is equal to 5, then base is a square. Find the surface area of a square by using the area formula for a square ($S^2$). For the pyramid base area, use base (b) for the side, or base = ($b^{2)}$. So the surface area of the base of that pyramid is equal to 5 x 5, or 25. The **Base Area** = 25.

The **Lateral Area** is easier. Multiply the perimeter by the side length (s) and divide by 2. This is because the sides are always triangles. Note that side length is also called 'slant' or 'slant height.'

The **Lateral Area** formula is: **P(S)/2 or (Perimeter times Side divided by 2)**

Then you just add all of these values together to get the total. (The values of each triangle and the value of the base)

Formula for Surface Area of a Pyramid:

## (P*S)/2 + Area of base (P = Perimeter, S = side or 'slant')

Just a reminder, you might need to use these formulas as well;

Area of a Triangle: $A = \frac{1}{2} b*h$ (b = base, h = height)

Area of a Square: $A = b^2$ (b = base)

Visit this links below to learn more about pyramids and use the interactive games……

**http://www.mathsisfun.com/geometry/pyramids.html**

**http://www.learner.org/interactives/geometry/3d_pyramids.html**

## Lesson 16 Review

Calculate the surface area of each pyramid with the following values. (P = perimeter, b = one side of the base, s=side, h=height). Number of sides is given in each problem. The first two have hints to let you know what the shape of the base is…..

1. P = 12 ft, s = 4 ft, b = 4 ft, h=2 ft, 3 sides (base is a triangle)

2. b = 4 in, P = 16 in, s = 12, 4 sides (base is a square)

3. P = 48 m, b = 12 m, s=12, 4 sides

4. P = 45 yds, b = 15 yds, s=15, h=12, 3 sides

5. b = 6 ft, P = 24 ft, s=6, 4 sides

6. P = 15 ft, b = 5 ft, s=5 ft, h= 4, 3 sides

7. b = 4 in, P = 16 in, s=11, 4 sides

8. P = 40 m, b = 10 m, s=10, 4 sides

9. P = 45 yds, b = 15 yds, s=10, h=8, 3 sides

10. b = 16 ft, P = 64 ft, s=8, 4 sides

11. b = 5 ft, P = 20 ft, s=7, 4 sides

12. P = 45 ft, b = 15 ft, s=10, h=8, 3 sides

13. b = 13 in, P = 52 in, s=11, 4 sides

14. P = 28 m, b = 7 m, s=8, 4 sides

15. P = 27 yds, b = 9 yds, s=30, h=25, 3 sides