Surface Area of Pyramids

Pyramids

We have three types of pyramids:

Triangular Based Pyramids

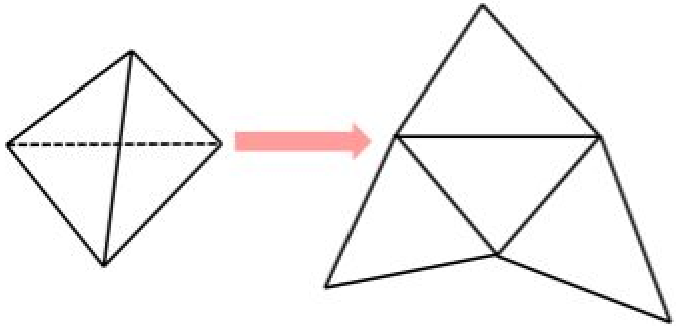
Rectangular Based Pyramids

and

Square Based Pyramids

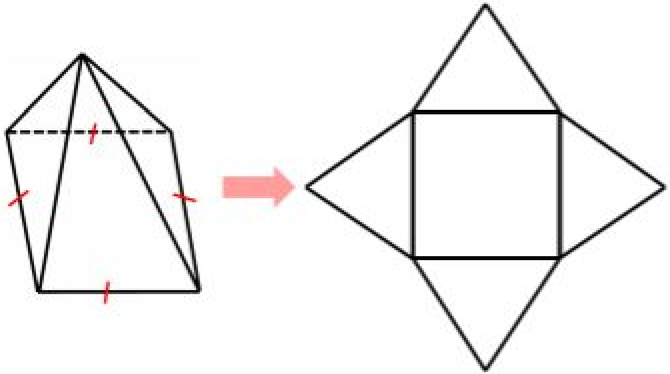
Nets: Triangular Based Pyramid

If we have a triangular pyramid, then the base is a triangle and the lateral faces are triangles.



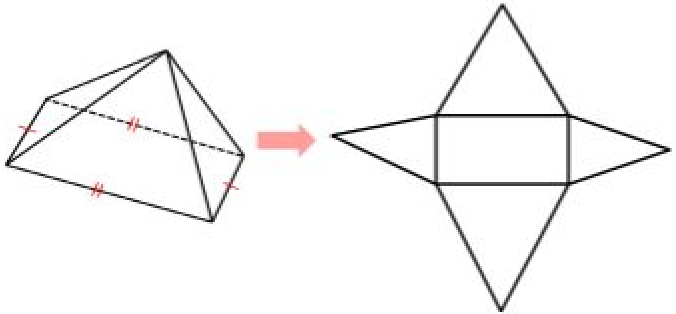
Nets: Square Based Pyramids

If the pyramid has a square base, then our net with have a square with four congruent triangles attached to each side.

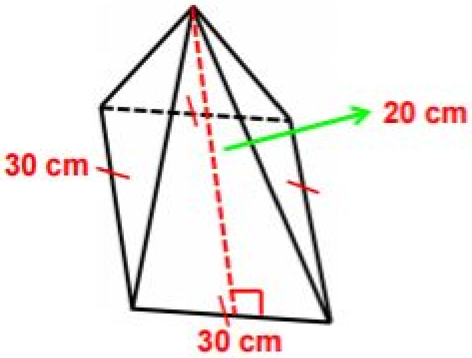


Nets: Rectangular Based Pyramids

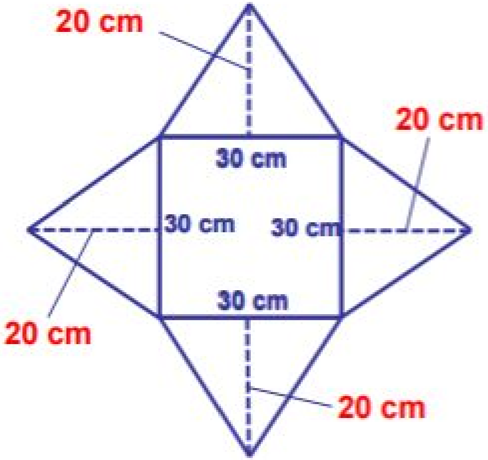
Rectangular pyramids are made up of a rectangle and 4 triangles as well. However, all 4 triangles are not congruent. Only the two opposite triangles will be congruent.



Example 1 - Square Based Pyramid



Let's draw the net of this pyramid.



Example 1 - Continued

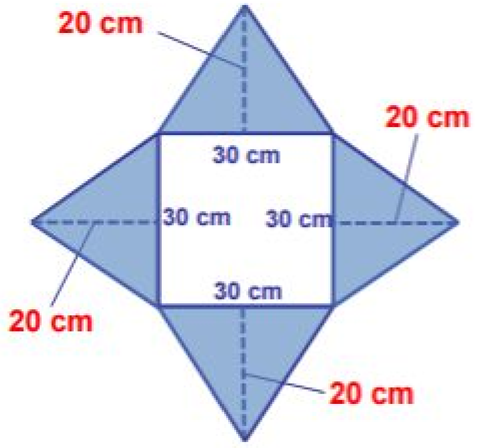
Now we can find the area of each face. Start by finding the area of the square in the center.

$$A = s^2$$

$$A = (30\text{ cm})^2$$

$$A = 900\text{ cm}^2$$

Example 1 - Continued



The four triangles are exactly the same. So we can find the area of one triangle and then multiply the area by 4 to represent the area of all 4 lateral faces.

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(30\text{ cm})(20\text{ cm})$$

$$A = \frac{1}{2}(600\text{ cm}^2)$$

$$A = 300\text{ cm}^2$$

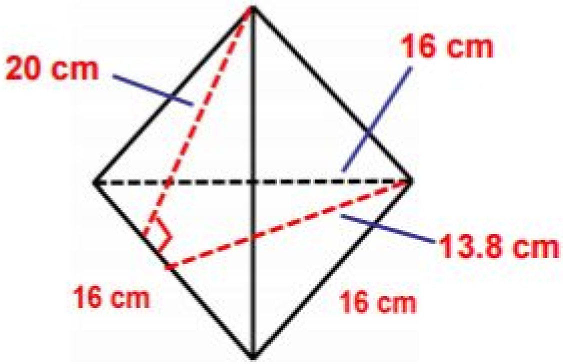
Example 1 - Continued

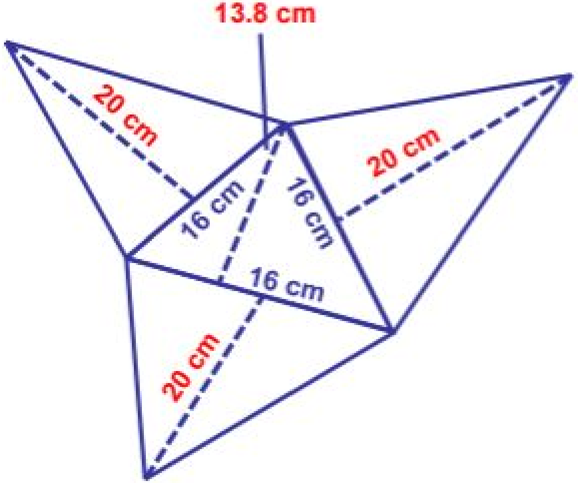
Now we take the area and quadruple it. $300\ cm^2 \times 4 = 1200\ cm^2$. This $1200\ cm^2$ represents all 4 triangles.

To get the total surface area of the square pyramid we will add the area of the square with the area of the triangles.

$$900\ cm^2 + 1200\ cm^2 = 2100\ cm^2$$

Example 2 - Triangular Based Pyramid





Example 2 - Continued

Now we can find the area of the base.

$$A = \frac{1}{2}\,bh$$

$$A = \frac{1}{2}(16\text{ cm})(13.8\text{ cm})$$

$$A = \frac{1}{2}(220.8\text{ cm}^2)$$

$$A = 110.4\text{ cm}^2$$

Example 2 - Continued

The three lateral faces are all congruent. So we can find the area of one triangle and then triple the amount.

$$A = \frac{1}{2}\ bh$$

$$A = \frac{1}{2}(16\text{ cm})(20\text{ cm})$$

$$A = \frac{1}{2}(320\text{ cm}^2)$$

$$A = 160\text{ cm}^2$$

So the area of all three would be $160\text{ cm}^2 \times 3 = 480\text{ cm}^2$.

Example 2 - Continued

Now, we will put all the areas of the faces together.

$$110.4\ cm^2 + 480\ cm^2 = 590.4\ cm^2$$

The total surface area of this triangular pyramid is 590.4 cm^2.