

▣ *homework check:* NPM 9 p. 446 #3 – 7, 9

▣ *note:* Surface Area of Right Pyramids and Cones

As we saw yesterday in our lesson, the surface area of a pyramid can be found by summing the area of each face and the base. In general, the surface area of a three dimensional figure is the combined area of the two dimensional faces from the net of the figure.

We can write our conclusions in terms formulas to use throughout.

$SA_{\text{square based pyramid}} = 2bL + b^2$ where b is the length of the base and L is the slant height

$$SA_{\text{pyramid}} = \frac{P_{\text{Base}}a}{2} + \frac{P_{\text{Base}}L}{2}$$

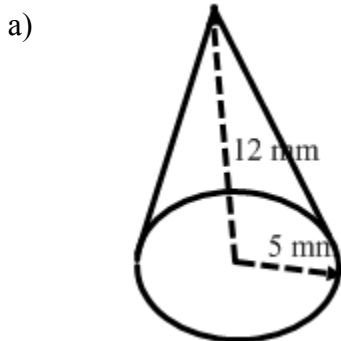
Note: The EQAO formula sheet uses “s” to represent slant height rather than L.

The surface area of a cone can be represented by the sum of two portions as well, the base circle and the curved slanted side:

$$SA = \pi r^2 + \pi rL$$

In a cone, the Pythagorean formula is used to find the slant height just as in the pyramid, but instead of using apothem and height, we use the radius of the circle and height.

For example, find the surface area of each of the following:



$$L = \sqrt{h^2 + r^2}$$

$$L = \sqrt{12^2 + 5^2}$$

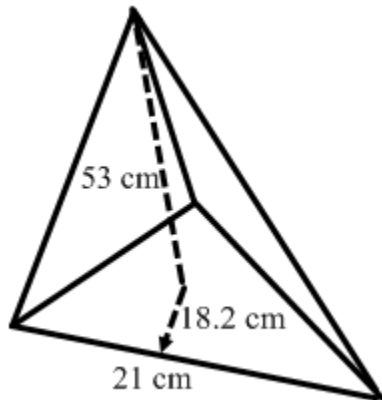
$$L = 13\text{mm}$$

$$SA = \pi r^2 + \pi rL$$

$$SA = \pi(5)^2 + \pi(5)(13)$$

$$SA = 282.7mm^2$$

b)



$$L = \sqrt{h^2 + a^2}$$

$$L = \sqrt{53^2 + 18.2^2}$$

$$L = 56.0cm$$

Finding your own formulas is also a possibility to calculate surface area. For example, our surface area can be found by calculating the sum of the area of the base and the 3 triangular faces:

$$SA = A_{base} + A_{3 \text{ triangular faces}}$$

$$SA = \frac{Pa}{2} + 3\left(\frac{1}{2}bh\right)$$

$$SA = \frac{21(3)(18.2)}{2} + 3\left(\frac{1}{2}\right)(21)(56)$$

$$SA = 573.3 + 1764$$

$$SA = 2337.3cm^2$$

It is important to note that surface area is the total of all faces and there is more than one possible way to calculate. Most importantly, you must be sure to include appropriate steps, measurements, and notations making your solutions easy to follow.

📌 **homework assignment:** NPM 9 p. 455 # 3, 6, 7, 10, 13, 14, 15, 17