

Surface Area of Pyramids and Cones.notebook

MAAPC20S

Measurement

Lesson 3

Lesson Three – Surface Areas of Right Pyramids and Right Cones

Recall:

Perimeter of a Square: $P = 4s$ $s = \text{side length}$

Area of a Square: $A = s^2$

Pythagorean Theorem: $a^2 + b^2 = c^2$

Right pyramid – are 3-dimensional objects that have triangular faces and a base that is a polygon.

Right circular cone – is a 3-dimensional object that has a circular base and a curved surface.

Tetrahedron – a triangular pyramid



Apex – the point where the triangular faces meet

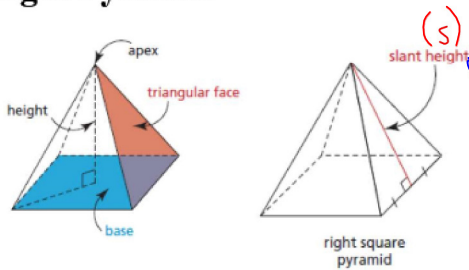
Height of the pyramid – is the perpendicular distance from the apex to the centre of the base.

Regular Polygon – a polygon that has all sides equal and all angles equal.

Lateral Area – the surface area of an object, not including the base (just the sides)

Slant Height – the height of a triangular face of a pyramid

Right Pyramid



If the base is a regular polygon, the triangular faces are congruent.

To find the surface area of a Right Pyramid, you can find the area of each side, and then add together.

Surface Area of a Right Pyramid with a Regular Polygon Base

Total SA = $\frac{(\text{Perimeter of the base})s}{2} + \text{base area}$

Lateral surface area (LSA) (area of whatever shape the base is)

on formula sheet $SA = \frac{Ps}{2} + B$

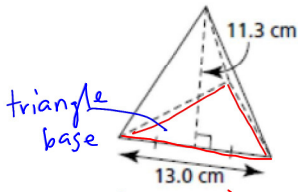
Surface Area of Pyramids and Cones.notebook

MAAPC20S

Measurement

Lesson 3

Example 1: Find the lateral area of this right pyramid to the nearest square unit.

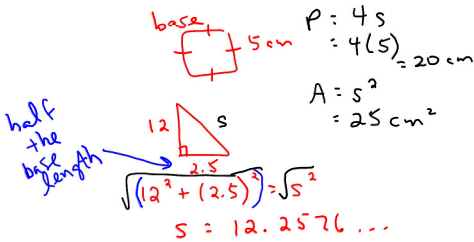


just area of the sides

$$\begin{aligned}
 LSA &= \frac{Ps}{2} \\
 &= \frac{39(11.3)}{2} \\
 &= 220.35 \text{ cm}^2 \\
 &\text{or } 220 \text{ cm}^2
 \end{aligned}$$

$P = 3(13) = 39$

Example 2: Calculate the surface area of a right square pyramid with a base length of 5 cm and a perpendicular height of 12 cm.

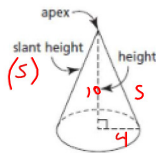


base = 5 cm
 $P = 4s = 4(5) = 20 \text{ cm}$
 $A = s^2 = 25 \text{ cm}^2$

$$\begin{aligned}
 SA &= \frac{Ps}{2} + B \\
 &= \frac{(12.2576...)(20)}{2} + 25 \\
 &= 147.577 \text{ cm}^2
 \end{aligned}$$

Note: Perpendicular height is given so use pyth theorem to determine slant height (s)

Surface Area of a Right Circular Cone



Surface Area of a Right Circular Cone

$$\begin{aligned}
 SA &= \text{lateral surface area} + \text{base area (circle)} \\
 &= \pi r s + \pi r^2
 \end{aligned}$$

Example 1: A right cone has a base radius of 4 m and a height of 10 m. Calculate the surface area of this cone to the nearest square metre.

$$\begin{aligned}
 4^2 + 10^2 &= s^2 \\
 116 &= s^2 \\
 \sqrt{116} &= s \\
 10.7703... &
 \end{aligned}$$

$$\begin{aligned}
 SA &= \pi r s + \pi r^2 \\
 &= \pi(4)(10.7703...) + \pi(4)^2 \\
 &= 185.6094... \\
 &\text{or } 186 \text{ m}^2
 \end{aligned}$$

perpendicular height

Example 2: The lateral area of a cone is 220 cm². The diameter of the cone is 10 cm. Determine the height of the cone to the nearest tenth of a centimeter.

need brackets in calc

$$\begin{aligned}
 LSA &= \pi r s \\
 220 &= \pi(5)s \\
 \frac{220}{5\pi} &= s \\
 s &= 14.0056...
 \end{aligned}$$



radius 5cm

$$\begin{aligned}
 h^2 &= (14.0056...) ^2 - 5^2 \\
 h &= \sqrt{\dots} \\
 h &= 13.1 \text{ cm}
 \end{aligned}$$

pg. 35
 # 1a, b
 3a, d, 17
 pg. 45 # 1e, 7, 13, 14