

Lesson 14.2:

Surface Areas of Pyramids

Essential Question

How can you find the surface area of a pyramid?

Key Idea

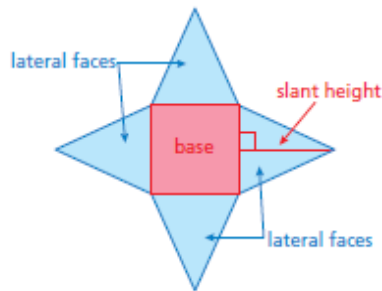
Surface Area of a Pyramid

The surface area S of a pyramid is the sum of the areas of the base and the lateral faces.



$$S = \text{area of base} + \text{areas of lateral faces}$$

We will be working with **regular pyramids**, meaning the bases are a regular polygons.

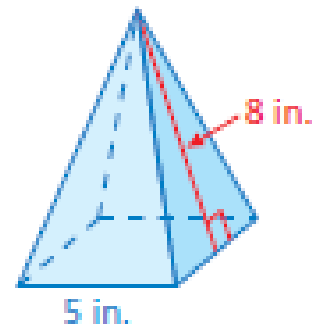


This also means that all of the faces are identical.

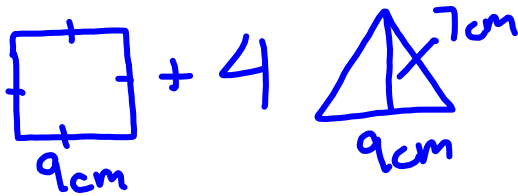
Find the surface area of the regular pyramid.

$$\begin{aligned} &\text{base} + 4 \text{ faces} \\ &(5 \text{ in} \cdot 5 \text{ in}) + 4 \left(\frac{1}{2} \cdot 5 \text{ in} \cdot 8 \text{ in} \right) \\ &25 \text{ in}^2 + 4(20 \text{ in}^2) \\ &25 \text{ in}^2 + 80 \text{ in}^2 \end{aligned}$$

$$\boxed{105 \text{ in}^2}$$



1. What is the surface area of a square pyramid with a base side length of 9 centimeters and a slant height of 7 centimeters?



$$(9\text{ cm})^2 + 4\left(\frac{1}{2} \cdot 9\text{ cm} \cdot 7\text{ cm}\right)$$

$$81\text{ cm}^2 + 4(31.5\text{ cm}^2)$$

$$81\text{ cm}^2 + 126\text{ cm}^2$$

$$\boxed{207\text{ cm}^2}$$

Find the surface area of the regular pyramid.

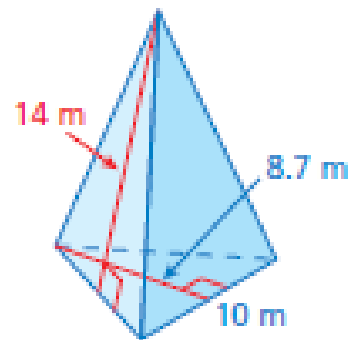
base + 3 faces
 ↑
 triangular

$$\frac{1}{2} \cdot 10\text{ m} \cdot 8.7\text{ m} + 3\left(\frac{1}{2} \cdot 10\text{ m} \cdot 14\text{ m}\right)$$

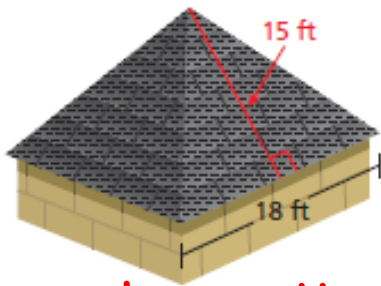
$$43.5\text{ m}^2 + 3(70\text{ m}^2)$$

$$43.5\text{ m}^2 + 210\text{ m}^2$$

$$\boxed{253.5\text{ m}^2}$$



A roof is shaped like a **square** pyramid. One bundle of shingles covers 25 square feet. How many bundles should you buy to cover the roof?



We only need the faces (lateral SA)

$$4 \left(\frac{1}{2} \cdot 18 \text{ ft} \cdot 15 \text{ ft} \right)$$

$$4 (135 \text{ ft}^2)$$

$$540 \text{ ft}^2$$

$$\frac{540 \text{ ft}^2}{25 \text{ ft}^2} = 21.6 \rightarrow \boxed{22 \text{ bundles}}$$

2. What is the surface area of the regular pyramid at the right?

base + 3 faces

$$\frac{1}{2} \cdot 6 \text{ ft} \cdot 5.2 \text{ ft} + 3 \left(\frac{1}{2} \cdot 6 \text{ ft} \cdot 10 \text{ ft} \right)$$

$$15.6 \text{ ft}^2 + 3 (30 \text{ ft}^2)$$

$$15.6 \text{ ft}^2 + 90 \text{ ft}^2$$

$$\boxed{105.6 \text{ ft}^2}$$

