NAME____

Module 13 **Perimeter, Area, and Volume**
Lesson 6 **Surface Area: Pyramids and Cones**

Lesson Notes 13.6

Lesson Objectives

- Derive and use formulas for surface area of pyramids and cones.
- Use square units to find the surface area of pyramids and cones.

Subtopic 1 Surface Area of Pyramid

The **slant height** of a regular pyramid is the height of a lateral face.

Surface Area of a Pyramid

$L = \frac{1}{2}Pl$

$SA = B + \frac{1}{2}Pl$

1 Find the total amount of material needed to construct the tent.

$$SA = B + \frac{1}{2}Pl$$

$$SA = (8 \text{ ft} \times 8 \text{ ft}) + \frac{1}{2}Pl$$

$$SA = 64 \text{ ft}^2 + \frac{1}{2}Pl$$

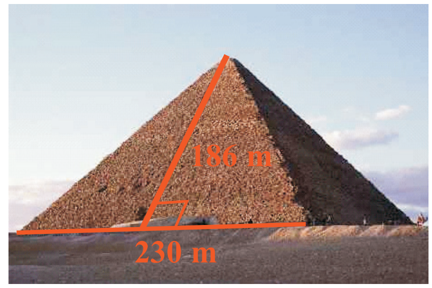
$$SA = 64 \text{ ft}^2 + \frac{1}{2}(32 \text{ ft}) \times 10 \text{ ft}$$

$$SA = 64 \text{ ft}^2 + 160 \text{ ft}^2$$

$$SA = 224 \text{ ft}^2$$

The tent needs 224 ft² of material.

2 Find the approximate lateral area of the Great Pyramid at Giza, Egypt. It is a square pyramid with an approximate base length of 230 meters and a slant height of 186 meters.



$$L = \frac{1}{2}Pl$$

$$L = \frac{1}{2}(4 \times 230\ \text{m})l$$

$$L = \frac{1}{2}(920\ \text{m}) \times 186\ \text{m}$$

$$L \approx 85{,}560\ \text{m}^2$$

The lateral area is about 85,560 m^2.

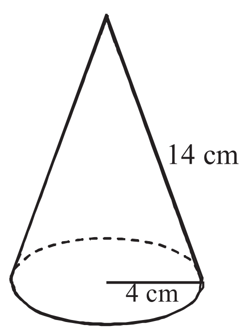
Subtopic 2 **Surface Area of Cone**

The slant height of a cone is the distance from the **vertex** to the **edge** of the base.

Surface Area of a **Cone**

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

3 Find the surface area of the cone.



$$\begin{aligned} SA &= \pi r^2 + \pi rl \\ &= 3.14 \times (4\ \text{cm})^2 + 3.14 \times 4\ \text{cm} \times 14\ \text{cm} \\ &= 50.24\ \text{cm}^2 + 175.84\ \text{cm}^2 \\ &\approx 226.08\ \text{cm}^2 \end{aligned}$$

The surface area is about 226.08 cm^2.

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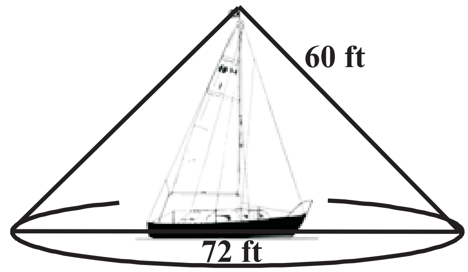
4 The antenna on a sailboat provides a "cone of protection" from lightning around the boat. This cone of protection has a diameter of 72 feet and a slant height of 60 feet. Find the surface area of the cone of protection. Round the answer to the nearest foot.



$$SA = \pi r^2 + \pi rl$$
$$= 3.14 \times (36 \text{ ft})^2 + 3.14 \times 36 \text{ ft} \times 60 \text{ ft}$$
$$= 4{,}069.44 \text{ ft}^2 + 6{,}782.4 \text{ ft}^2$$
$$\approx 10{,}851.84 \text{ ft}^2$$

The surface area is about 10,852 ft^2.