Chapter 11: Surface Area & Volume

SECTION B: SURFACE AREA OF CONES & PYRAMIDS

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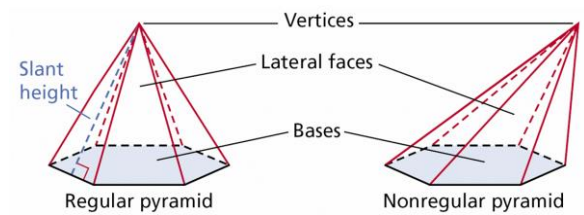
I Can

- ❑ Apply the formula for the surface area of a cone
- ❑ Apply the formula for the surface area of a pyramid

Pyramids

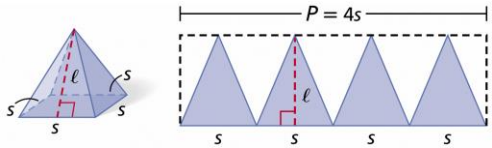
- The **vertex of a pyramid** is the point opposite the base of the pyramid.
- The base of a **regular pyramid** is a regular polygon, and the lateral faces are congruent isosceles triangles.
- The **slant height of a regular pyramid** is the distance from the vertex to the midpoint of an edge of the base.
- The **altitude of a pyramid** is the perpendicular segment from the vertex to the plane of the base.

Pyramids



Pyramids

The lateral faces of a regular pyramid can be arranged to cover half of a rectangle with a height equal to the slant height of the pyramid. The width of the rectangle is equal to the base perimeter of the pyramid.



LA & SA of Regular Pyramids

Lateral and Surface Area of a Regular Pyramid

The lateral area of a regular pyramid with perimeter P and slant height ℓ is $L = \frac{1}{2}P\ell$.

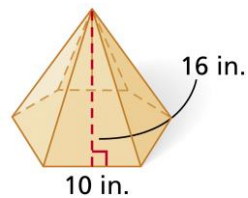
The surface area of a regular pyramid with lateral area L and base area B is $S = L + B$, or $S = \frac{1}{2}P\ell + B$.

Example

Find the lateral area and surface area of a regular square pyramid with base edge length 14 cm and slant height 25 cm. Round to the nearest tenth, if necessary.

Example

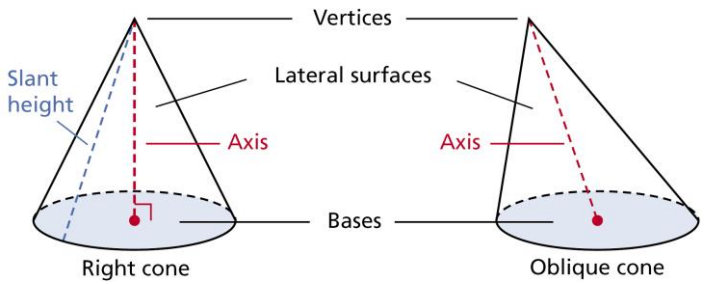
Find the lateral area and surface area of the regular pyramid.



Cones

- The **vertex of a cone** is the point opposite the base.
- The **axis of a cone** is the segment with endpoints at the vertex and the center of the base.
- The axis of a **right cone** is perpendicular to the base.
- The axis of an **oblique cone** is *not* perpendicular to the base.
- The **slant height of a right cone** is the distance from the vertex of a right cone to a point on the edge of the base.
- The **altitude of a cone** is a perpendicular segment from the vertex of the cone to the plane of the base.

Cones

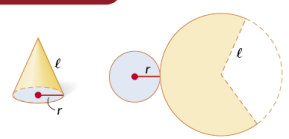


LA & SA of Cones

Lateral and Surface Area of a Right Cone

The lateral area of a right cone with radius r and slant height ℓ is $L = \pi r\ell$.

The surface area of a right cone with lateral area L and base area B is $S = L + B$, or $S = \pi r\ell + \pi r^2$.

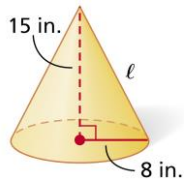


Example

Find the lateral area and surface area of a right cone with radius 9 cm and slant height 5 cm.

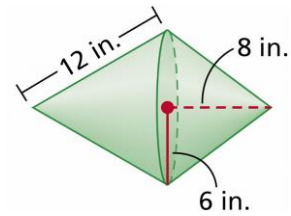
Example

Find the lateral area and surface area of the cone.



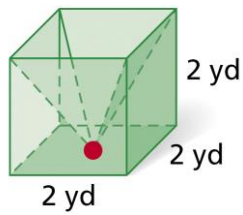
Composite Figures

Find the surface area of the composite figure.



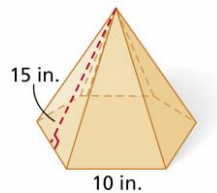
Composite Figures

Find the surface area of the composite figure.



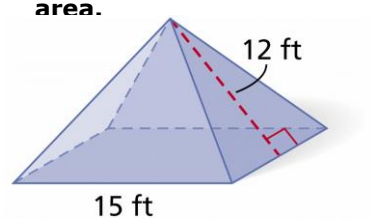
Effects of Changing Dimensions

The base edge length and slant height of the regular hexagonal pyramid are both divided by 5. Describe the effect on the surface area.



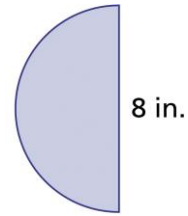
Effects of Changing Dimensions

The base edge length and slant height of the regular square pyramid are both multiplied by 2/3. Describe the effect on the surface area.



Real World Example

If the pattern shown is used to make a paper cup, what is the diameter of the cup?



I Can

- Apply the formula for the surface area of a cone
- Apply the formula for the surface area of a pyramid