# 10-6 Study Guide and Intervention
Surface Area

Prisms and Cylinders In a solid figure, faces that are not bases are **lateral faces.** The
lateral area is the sum of the area of the lateral faces. The **surface area** is the sum of the
lateral area and the area of the bases. The **axis** of a cylinder is the segment with endpoints
at the centers of these circles. For a right cylinder, the axis is also the altitude (height) of
the cylinder.

pentagonal prism
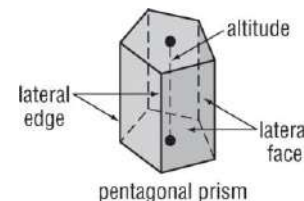
Lateral Area of a Prism	If a prism has a lateral area of L square units, a height of h units, and each base has a perimeter of P units, then $L = Ph$.
Surface Area of a Prism	If a prism has a surface area of S square units, a lateral area of L square units, and each base has an area of B square units, then $S = L + 2B$ or $S = Ph + 2B$.
Lateral Area of a Cylinder	If a cylinder has a lateral area of L square units, a height of h units, and a base has a radius of r units, then $L = 2\pi rh$.
Surface Area of a Cylinder	If a cylinder has a surface area of S square units, a height of h units, and a base has a radius of r units, then $S = L + 2B$ or $2\pi rh + 2\pi r^2$.

**Example: Find the surface area of a regular pentagonal prism if each side of the base has a measure of
15 centimeters and the height of the prism is 10 centimeters.**

$L = Ph$ Lateral area of a prism

$= 75(10)$ $P = 5(15) = 75, h = 10$

$= 750$ Multiply.
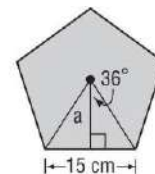
$S = L + 2B$

$= 750 + 2\left(\frac{1}{2}aP\right)$

$= 750 + \left(\frac{7.5}{\tan 36°}\right)(75)$
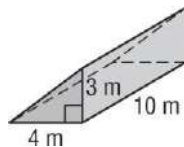
≈ 1524.2

$\tan 36° = \dfrac{7.5}{a}$

$a = \dfrac{7.5}{\tan 36°}$
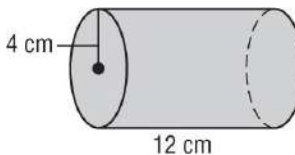
So, the surface area is about 1524.2 square centimeters.

Exercises

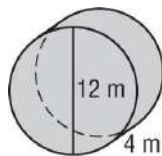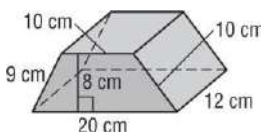**Find the surface area of each solid. Round to the nearest tenth if necessary.**
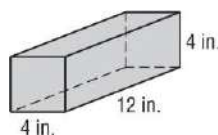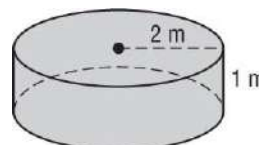
1.

2.


3.

4.

5.

6.

10-6 Study Guide and Intervention *(continued)*
Surface Area

Pyramids and Cones The lateral faces of a pyramid intersect in a common point known as the vertex. The altitude is the segment from the vertex that is perpendicular to the base. For a **regular pyramid,** the base is a regular polygon and the altitude has an endpoint at the center of the base. All the lateral edges are congruent and all the lateral faces are congruent isosceles triangles. The height of each lateral face is called the **slant height.**
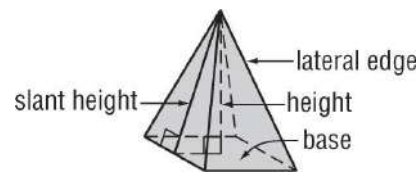
A cone has a circular base and a vertex. The axis of the cone is the segment with endpoints at the vertex and the center of the base. If the axis is also the altitude, then the cone is a **right cone**. If the axis is not the altitude, then the cone is an **oblique cone**.

Lateral Area of a Regular Pyramid	The lateral area L of a regular pyramid is $L = \frac{1}{2}P\ell$, where ℓ is the slant height and P is the perimeter of the base.
Surface Area of a Regular Pyramid	The surface area S of a regular pyramid is $S = \frac{1}{2}P\ell + B$, where ℓ is the slant height, P is the perimeter of the base, and B is the area of the base.
Lateral Area of a Cone	The lateral area L of a right circular cone is $L = \pi r\ell$, where r is the radius and ℓ is the slant height.
Surface Area of a Cone	The surface area S of a right cone is $S = \pi r\ell + \pi r^2$, where r is the radius and ℓ is the slant height.

Example: For a right cone, find the surface area if the radius is 6 centimeters and the height is 8 centimeters. Round to the nearest tenth if necessary.

Find the slant height.

$\ell^2 = 6^2 + 8^2$	Pythagorean Theorem	$L = \pi r\ell$	Lateral area of a right cone	$S = \pi r\ell + \pi r^2$	Surface area of a right cone
$\ell^2 = 100$	Simplify.	$= \pi(6)(10)$ $r = 6, \ell = 10$		$\approx 188.5 + \pi(6^2)$ $\pi r\ell \approx 188.5, r = 6$	
$\ell = 10$	Take the positive square root of each side.	≈ 188.5	Simplify.	≈ 301.6	Simplify.

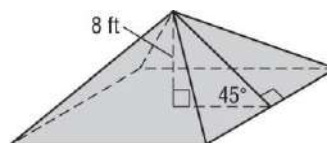The lateral area is about 188.5 square centimeters and the surface area is about 301.6 square centimeters.

Exercises

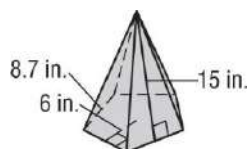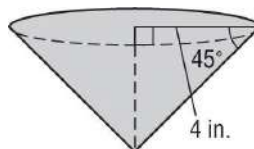**Find the surface area of each solid. Round to the nearest tenth.**

1.

12 cm
9 cm

2.

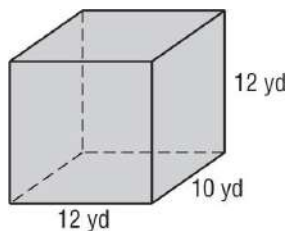8 ft
45°

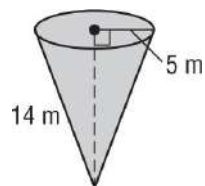**3.**

8.7 in.
6 in.
15 in.

4.

45°
4 in.
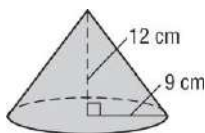
10-6 Skills Practice
Surface Area

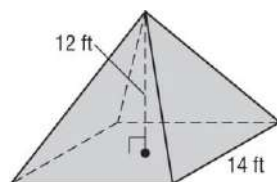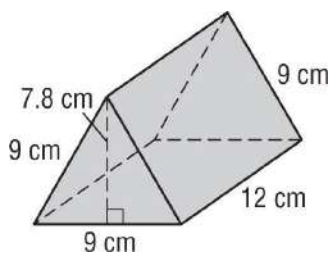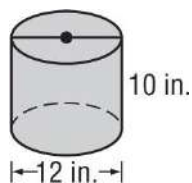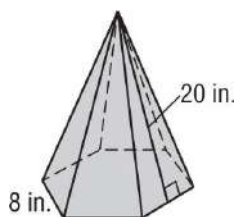**Find the surface area of each solid. Round to the nearest tenth if necessary.**

1.

12 yd

10 yd

12 yd

2.

5 m

14 m

3.

12 ft

14 ft

4.

7.8 cm

9 cm

9 cm

9 cm

12 cm

5.

10 in.

|←12 in.→|

6.

20 in.

8 in.

7.

10 ft

25 ft

8.

8 in.

12 in.