

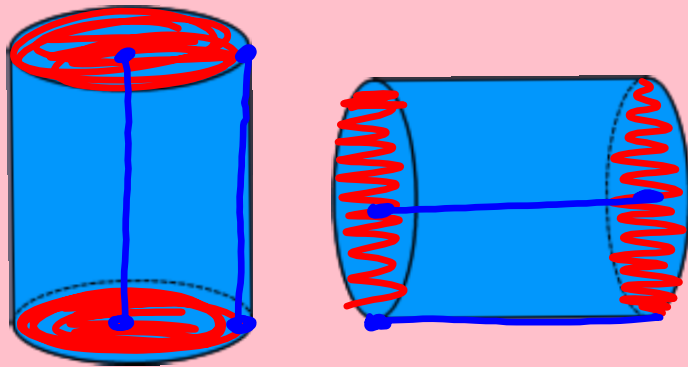
Geometry

Ch. 11 Handout 11.2

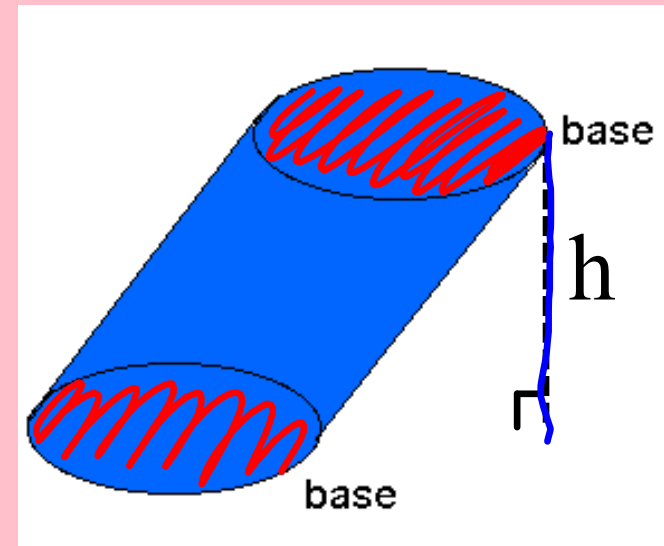
Surface Area of Cylinders and Cones

Cylinders

A **cylinder** has two congruent parallel bases and the bases are circles.

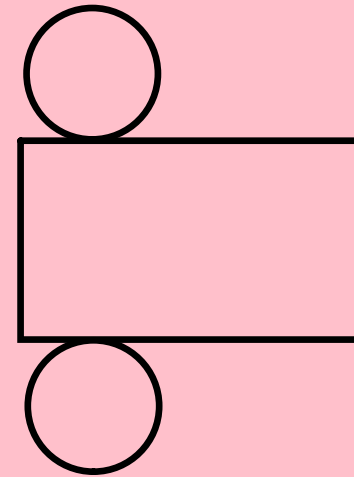
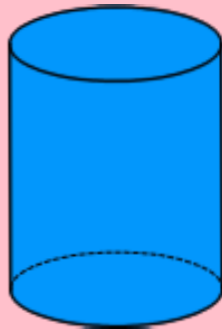


Right Cylinders



Oblique Cylinders

Net of a Cylinder



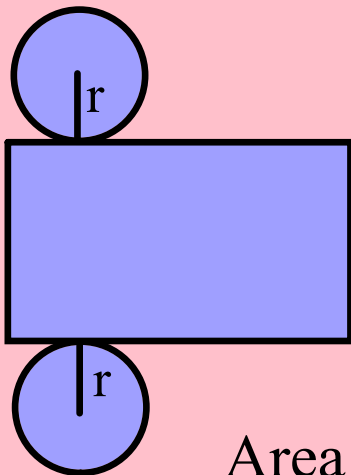
Lateral Area

 h  $2\pi r$ 

$$LA = (2\pi r)h$$

$$LA = ph$$

Surface Area



$$SA = LA + 2B$$

$$(2\pi r)h + 2\pi r^2$$

Area of a base $\rightarrow B = \pi r^2$

Lateral and Surface Areas of a Cylinder

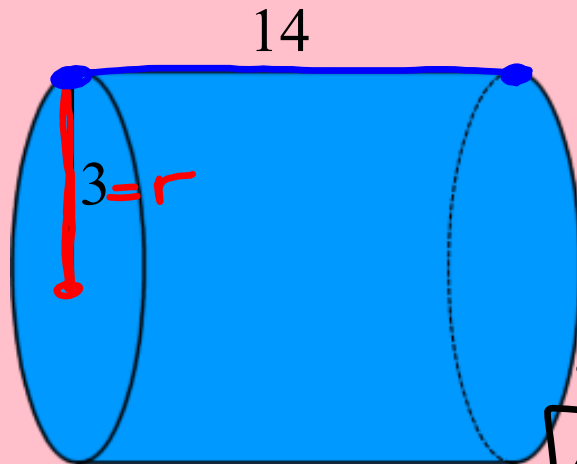
The lateral area of a right cylinder is the product of the circumference of the base and the height of the cylinder.

$$LA = \overset{(P)}{C} h = 2\pi r h$$

The surface area of a right cylinder is the sum of the lateral area and the areas of the two bases.

$$SA = LA + 2B \quad \text{or} \quad SA = 2\pi r h + 2\pi r^2$$

1. Find the lateral area and surface area of the cylinder.



$$r = 3$$

$$h = 14$$

$$p = 2\pi r = 2\pi(3) = 6\pi$$

$$B = \pi r^2 = \pi(3)^2 = 9\pi$$

$$LA = ph$$

$$LA = (6\pi)(14)$$

$$LA = 84\pi \text{ un}^2$$

$$SA = LA + 2B$$

$$SA = 84\pi + 2(9\pi) \\ = 84\pi + 18\pi$$

$$SA = 102\pi \text{ un}^2$$

2. A cylindrical can of corn has a 6 in diameter and a height of 8 in. What is the surface area of the entire container?

$$r = 3$$

$$h = 8$$

$$P = 2\pi r = 2\pi(3) = 6\pi$$

$$B = \pi r^2 = \pi(3)^2 = 9\pi$$

$$\begin{aligned} LA &= Ph \\ &= 6\pi(8) \\ LA &= 48\pi \text{ in}^2 \end{aligned}$$

$$\begin{aligned} SA &= LA + 2B \\ SA &= 48\pi + 2(9\pi) \\ SA &= 48\pi + 18\pi \\ \boxed{SA &= 66\pi \text{ in}^2} \end{aligned}$$



3. A company sells cornmeal and oatmeal in cylindrical containers. The diameter of the base of the 6-in high cornmeal container is 4 in. The diameter of the base of the 4-in high oatmeal container is 6 in. Which container has the greater surface area?



$$r = 2$$

$$h = 6$$

$$p = 2\pi(2) = 4\pi$$

$$B = \pi(2)^2 = 4\pi$$

$$LA = ph$$

$$= 4\pi(6) = 24\pi$$

$$SA = LA + 2B$$

$$= 24\pi + 2(4\pi) = 32\pi$$



$$r = 3$$

$$h = 4$$

$$p = 2\pi(3) = 6\pi$$

$$B = \pi(3)^2 = 9\pi$$

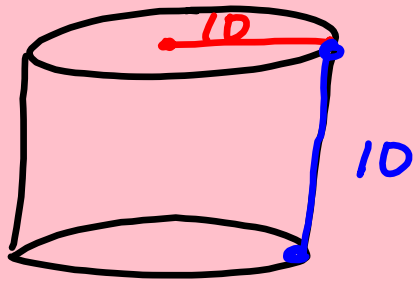
$$LA = ph$$

$$= 6\pi(4) = 24\pi$$

$$SA = 24\pi + 2(9\pi) = 42\pi$$

Quaker Oats

4. Find the surface area of the cylinder with height 10 cm. and radius 10 cm in terms of π .



$$r = 10$$

$$h = 10$$

$$P = 2\pi(10) = 20\pi$$

$$B = \pi(10)^2 = 100\pi$$

$$\begin{aligned} LA &= Ph \\ &= 20\pi(10) \end{aligned}$$

$$LA = 200\pi \text{ cm}^2$$

$$SA = LA + 2B$$

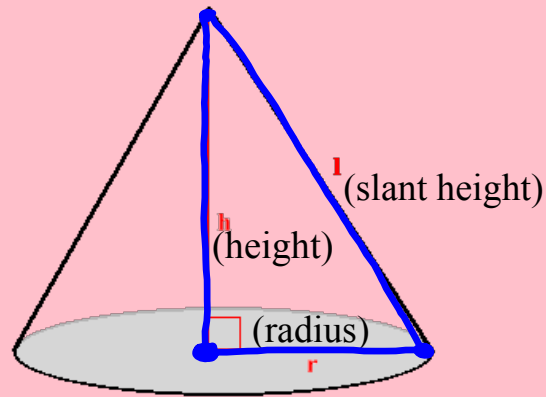
$$= 200\pi + 2(100\pi)$$

$$SA = 400\pi \text{ cm}^2$$

Cones

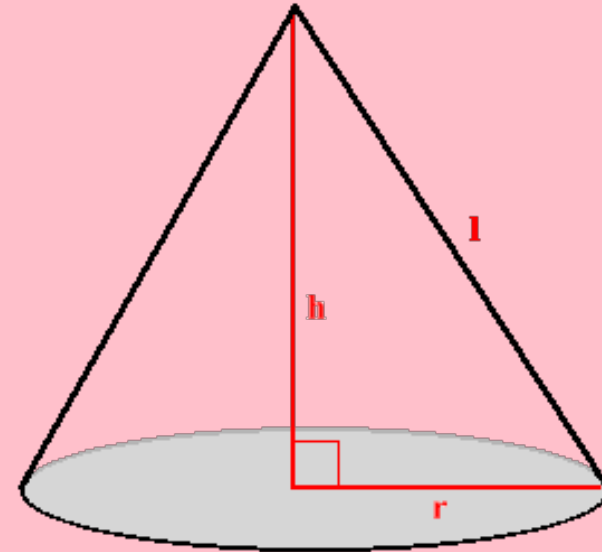
A **cone** is a three-dimensional figure whose base is a circle. It looks similar to a pyramid.

In a **right cone**, the **altitude** is a perpendicular segment from the **vertex** to the center of the base. The **height**, h , is the length of the altitude and the **slant height**, ℓ , is the distance from the vertex to a point on the edge of the base.



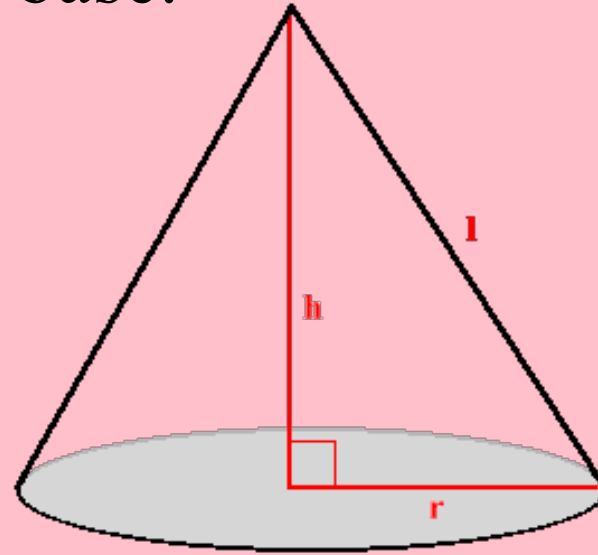
The **lateral area of a right cone** is half the product of the perimeter of the base and the slant height.

$$LA = \frac{1}{2} c \ell = \frac{1}{2} (2 \pi r) \ell = \pi r \ell$$



The **surface area of a right cone** is the sum of the lateral area and the area of the base.

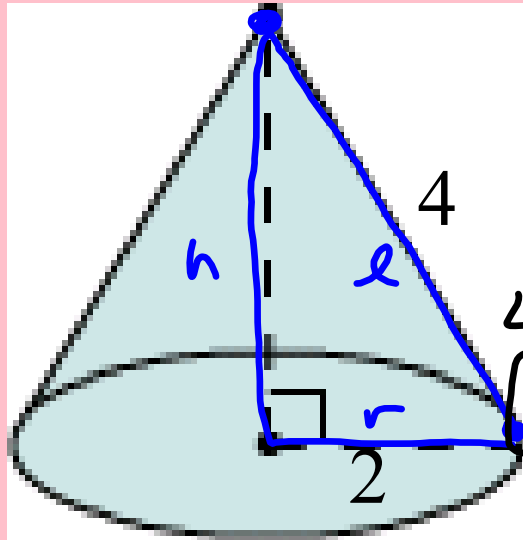
$$SA = LA + B$$



1. Find the lateral area and surface area of the cone in terms of π .

$$\text{radius} = 2, \ell = 4 \quad p = 2\pi(r) = 4\pi$$

$$B = \pi(2)^2 = 4\pi$$



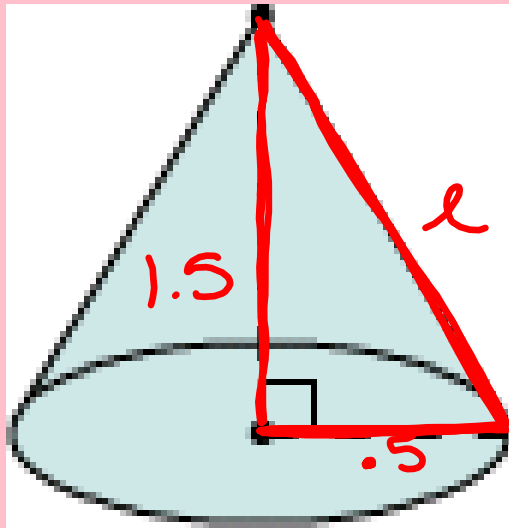
$$LA = \frac{1}{2} p \ell$$

$$SA = LA + B$$

$$LA = \frac{1}{2} (4\pi)(4) \quad SA = 8\pi + 4\pi$$

$$LA = 8\pi \text{ un}^2 \quad SA = 12\pi \text{ un}^2$$

2. LeAnn uses paper cones to cover her plants in the early spring. The diameter of each cone is 1 ft, and its height is 1.5 ft. How much paper is in the cone? Round your final answer to the nearest tenth.



$$l = \frac{\sqrt{10}}{2}$$

$$P = 2\pi(.5) = \pi$$

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

$$LA = \frac{1}{2}(\pi)\left(\frac{\sqrt{10}}{2}\right)$$

$$LA = \frac{\pi\sqrt{10}}{4} \text{ ft}^2 \approx 2.5 \text{ ft}^2$$

$$(1.5)^2 + (.5)^2 = l^2$$

$$2.25 + .25 = l^2$$

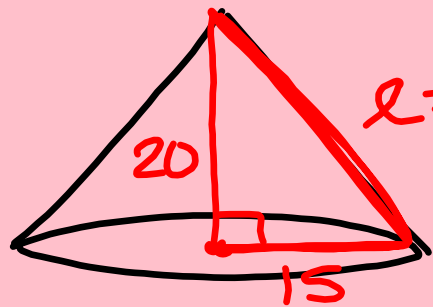
$$l^2 = 2.5$$

$$\sqrt{l^2} = \sqrt{\frac{5}{2}}$$

$$l = \frac{\sqrt{5}\sqrt{2}}{\sqrt{2}\sqrt{2}}$$

$$l = \frac{\sqrt{10}}{2}$$

3. Find the lateral area and surface area of the cone with radius 15 in. and height 20 in. to the nearest square inch.



$$20^2 + 15^2 = l^2$$

$$l^2 = 625$$

$$l = 25$$

$$l = 25$$

$$P = 2\pi(15) = 30\pi$$

$$B = \pi(15)^2 = 225\pi$$

$$\begin{aligned} LA &= \frac{1}{2} P l \\ &= \frac{1}{2} (30\pi)(25) \\ &= 375\pi \text{ in}^2 \end{aligned}$$

$$\begin{aligned} SA &= LA + B \\ SA &= 375\pi + 225\pi \\ SA &= 600\pi \text{ in}^2 \end{aligned}$$

Assignment:

Pg 612 8-15, 27, 29

Pg 620 8-13, 21, 24, 38