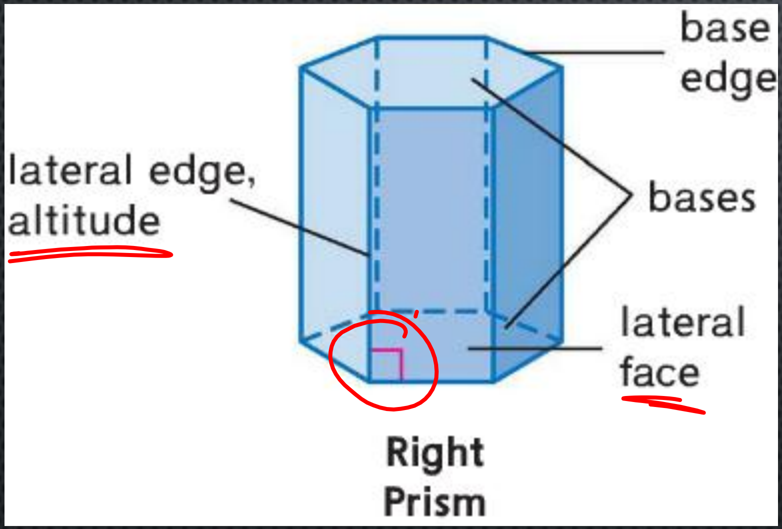
# SURFACE AREA OF:

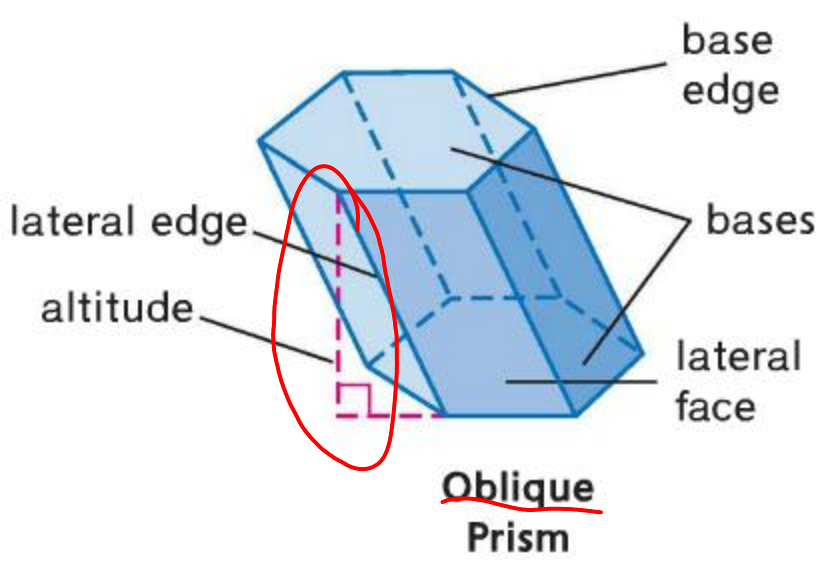
PRISMS AND CYLINDERS

PYRAMIDS AND CONES

SPHERES

# LATERAL AREAS AND SURFACE AREAS OF PRISMS



# LATERAL AREA OF A PRISM

- The lateral area $L$ of a right prism is $L = Ph$, where $h$ is the height of the prism and $P$ is the perimeter of a base.

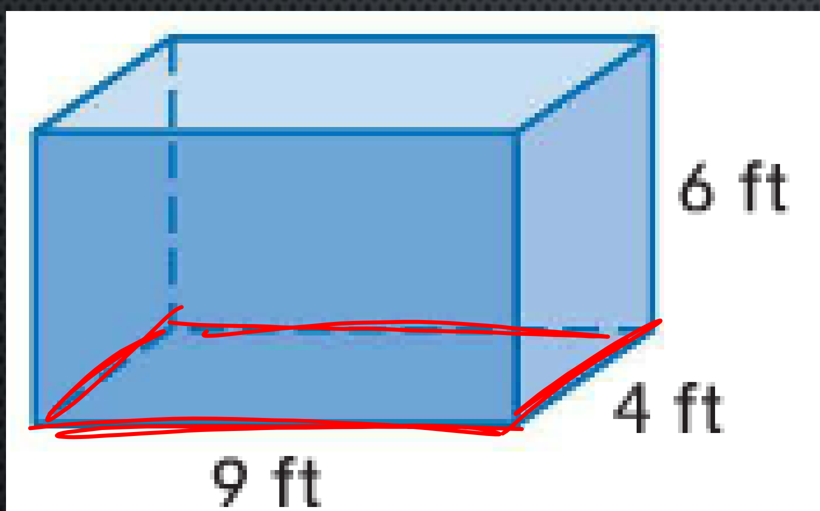
# Surface Area of a Prism

- The surface area $S$ of a right prism is $S = L+2B$, where $L$ is the lateral area and $B$ is the area of a base.

# EXAMPLES

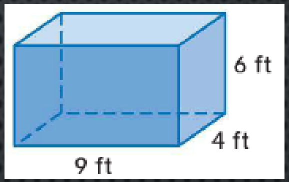
$$S = L + 2B$$
$$= Ph + 2lw$$
$$= (26)(6) + 2(9)(4)$$

- Find the surface area of the prism.



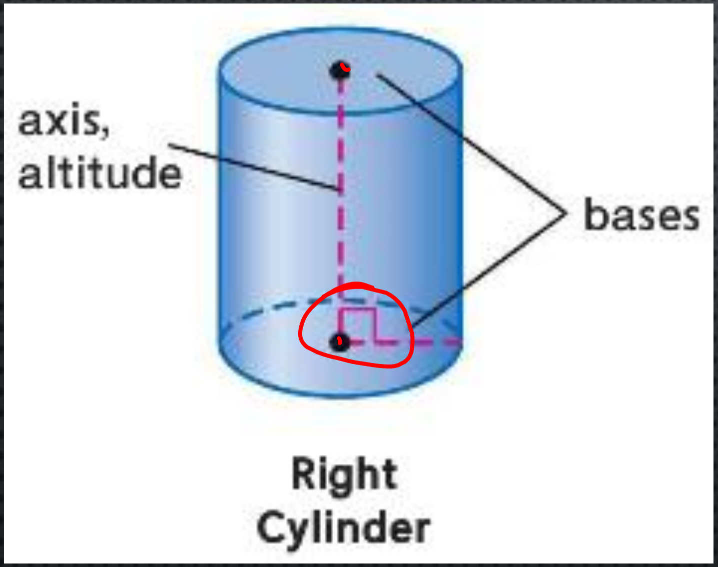
# EXAMPLES

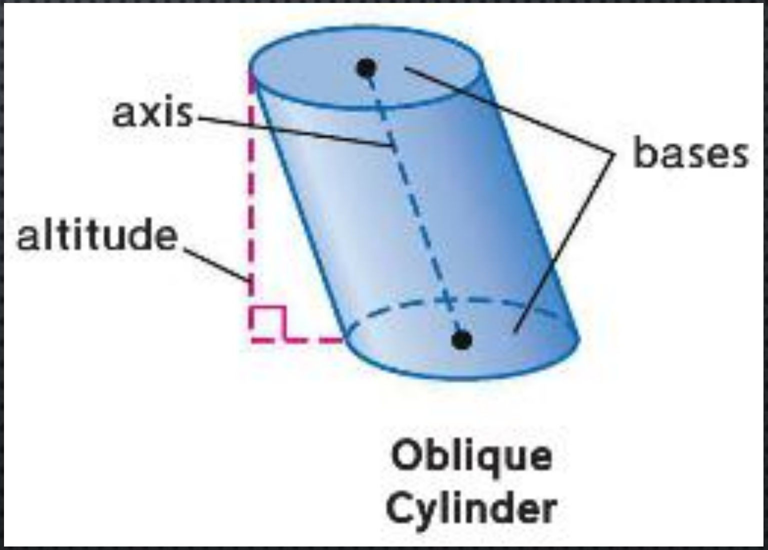
- Find the surface area of the prism.




- S = L + 2B; L = Ph → S = Ph + 2B
- P = 2l + 2b = 2(4) + 2(6) = 8 + 12 = 20
- B = 6 * 4 = 24; h = 9
- S = (20)(9) + 2(24)
- = 180 + 48
- = 228

# LATERAL AREAS AND SURFACE AREAS OF CYLINDERS



# Lateral Area of a Cylinder

- The lateral area $L$ of a right cylinder is $L = 2\pi rh$, where $r$ is the radius of a base and $h$ is the height.

# Surface Area of a Cylinder

- The surface area $S$ of a right cylinder is

  $S = 2\pi rh + 2\pi r^2$,

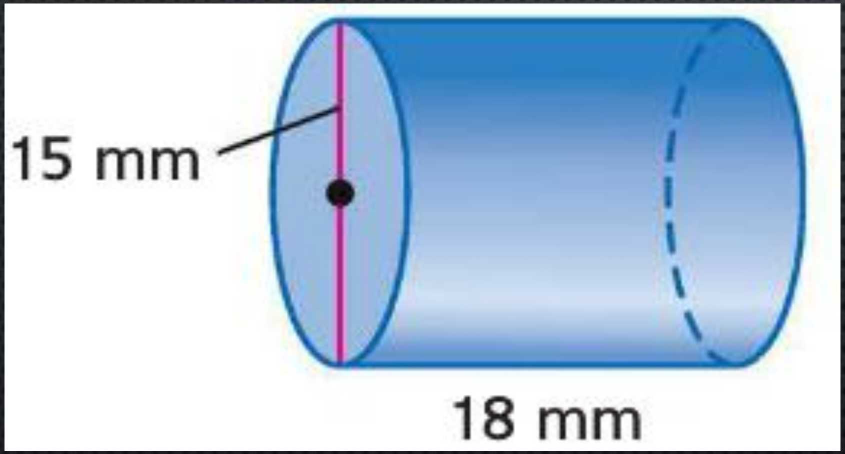
  where $r$ is the radius of a base and $h$ is the height.

$L = 2\pi r h$

$= 2\pi(7.5)(18)$

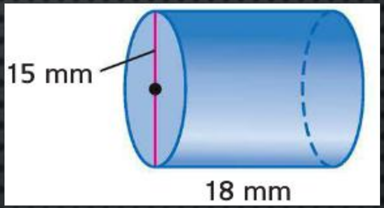
# EXAMPLES

- Find the lateral area and the surface area of the cylinder. Round to the nearest tenth.



# EXAMPLES

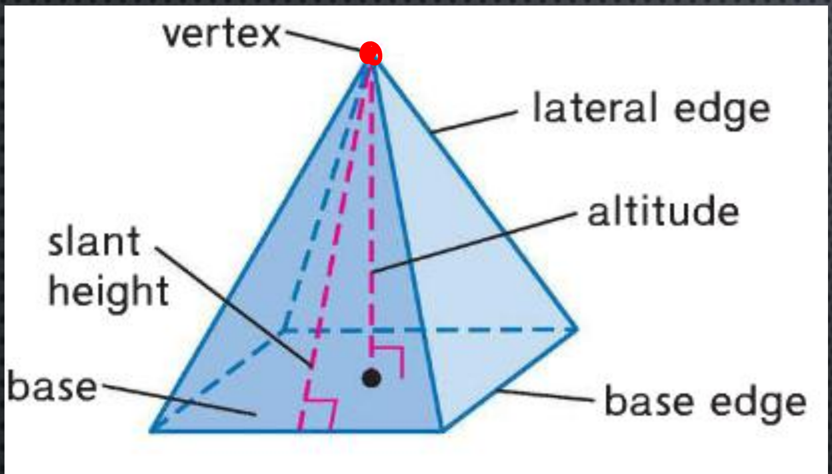
- Find the lateral area and the surface area of the cylinder. Round to the nearest tenth.



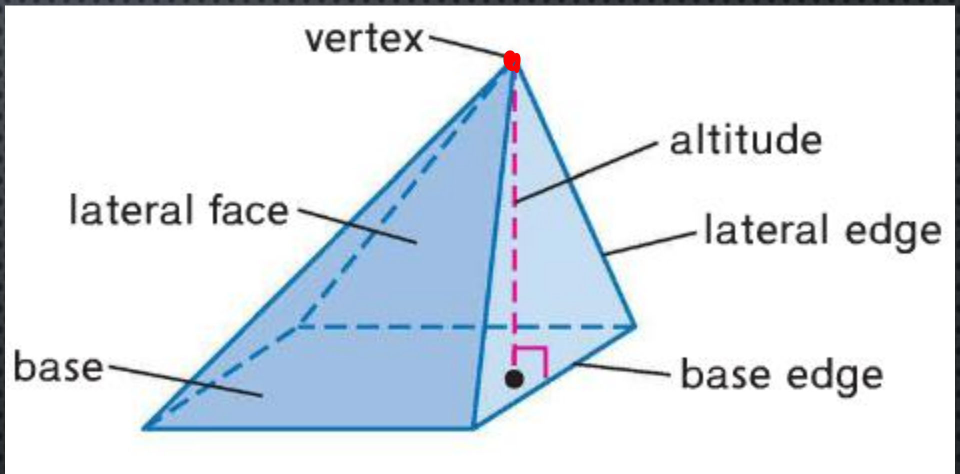

- $L = 2\pi rh$; $r = \frac{15}{2} = 7.5$, $h = 18$
- $L = 2\pi(7.5)(18) = 270\pi = 848.2$

- $S = L + 2B$; $B = \pi R^2$
- $S = 270\pi + 2\pi(7.5^2)$
- $S = 270\pi + 112.5\pi = 382.5\pi = 1201.7$

# PYRAMIDS


**Regular Pyramid**



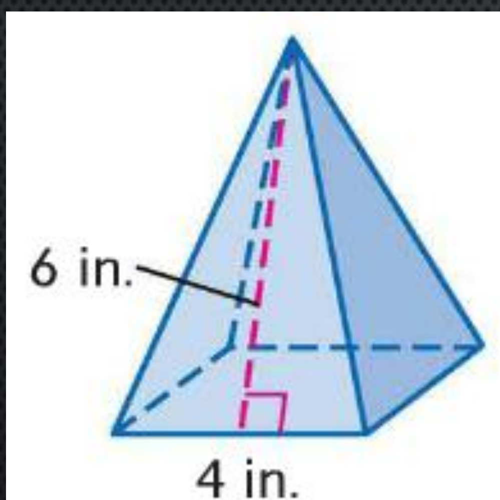

**Nonregular Pyramid**

# LATERAL AREA OF A REGULAR PYRAMID

- THE LATERAL AREA $L$ OF A REGULAR PYRAMID IS $L = \frac{1}{2}P\ell$, WHERE $P$ IS THE PERIMETER OF THE BASE AND $\ell$ IS THE SLANT HEIGHT.

# EXAMPLES

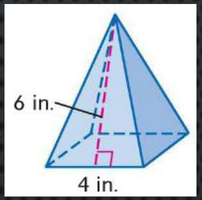
- FIND THE LATERAL AREA OF THE SQUARE PYRAMID.




$$L = \frac{1}{2}P\ell$$
$$= \frac{1}{2}(16)(6)$$
$$= 48$$

# EXAMPLES

- FIND THE LATERAL AREA OF THE SQUARE PYRAMID.




- $L = \frac{1}{2}P\ell$; P = 4 * 4 = 16; $\ell = 6$
- $L = \frac{1}{2}(16) * (6) = 48$

# Surface Area of a Regular Pyramid

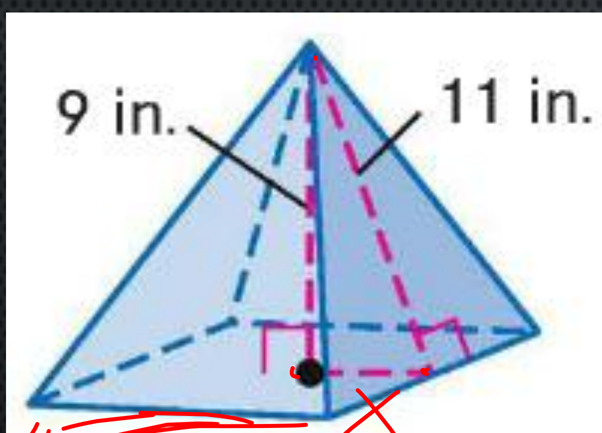
- The surface area $S$ of a regular pyramid is $S = \frac{1}{2}P\mathcal{L} + B$, where $P$ is the perimeter of the base, $\mathcal{L}$ is the slant height, and $B$ is the area of the base.

# EXAMPLES

$S = \frac{1}{2}P\ell + B$

$= \frac{1}{2}(8\sqrt{40})(11) + (2\sqrt{40})^2$

- Find the surface area of the pyramid to the nearest tenth.




$4 \cdot 2\sqrt{40}$

$x^2 + 9^2 = 11^2$

$x^2 + 81 = 121$

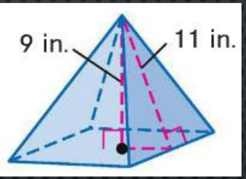
$-81 \quad -81$

$\sqrt{x^2} = \sqrt{40}$

$x = \sqrt{40}$

# EXAMPLES

- FIND THE SURFACE AREA OF THE PYRAMID TO THE NEAREST TENTH.




- $S = \frac{1}{2}P\mathcal{L} + B$
- $11^2 - 9^2 = 40$; $\sqrt{40} = \frac{1}{2}s \rightarrow s = 2\sqrt{40} = 4\sqrt{10}$
- $P = 4 * 4\sqrt{10} = 16\sqrt{10}$; $B = (4\sqrt{10})^2 = 160$
- $S = \frac{1}{2}(16\sqrt{10})(11) + 160$
- $S = 438.3$

$7^2 + 2.75^2 = l^2$

$49 + 7.56 = l^2$

$\sqrt{56.56} = l$

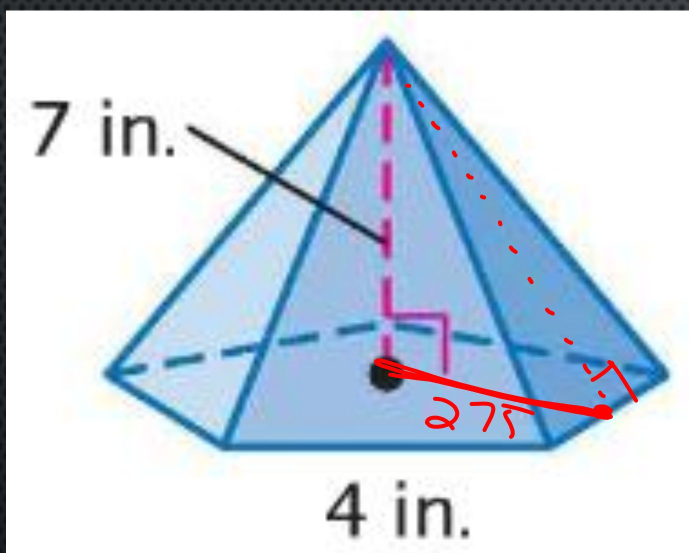
# Examples

$l = 7.52$

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

$= \frac{1}{2}(20)(7.52) + (27.5)$

- Find the surface area of the regular pyramid to the nearest tenth.





$A = \frac{1}{2}Pa$

$\tan 36 = \frac{2}{a}$

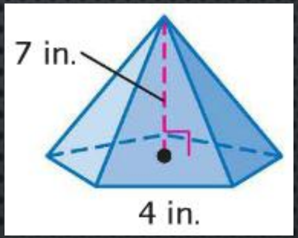
$a = \frac{2}{\tan 36} = 2.75$

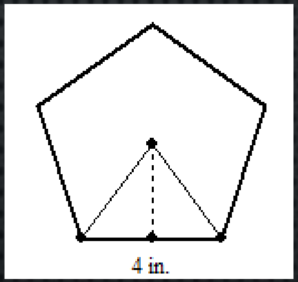
$A = \frac{1}{2}(20)(2.75)$

$= 27.5$

# EXAMPLES

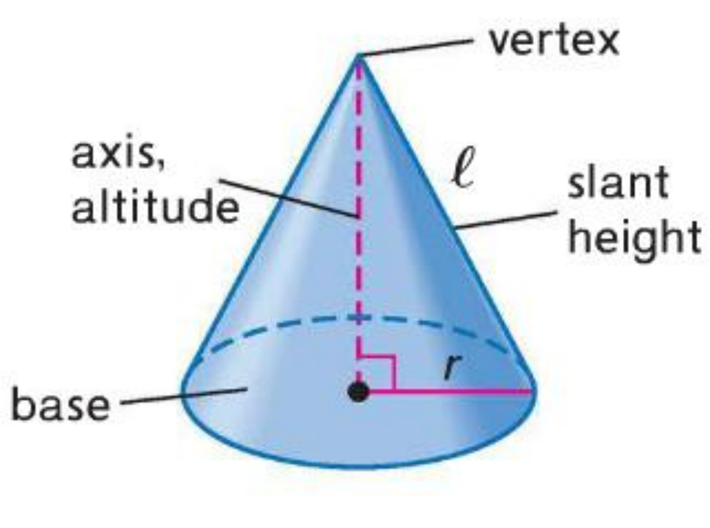
- FIND THE SURFACE AREA OF THE REGULAR PYRAMID TO THE NEAREST TENTH.



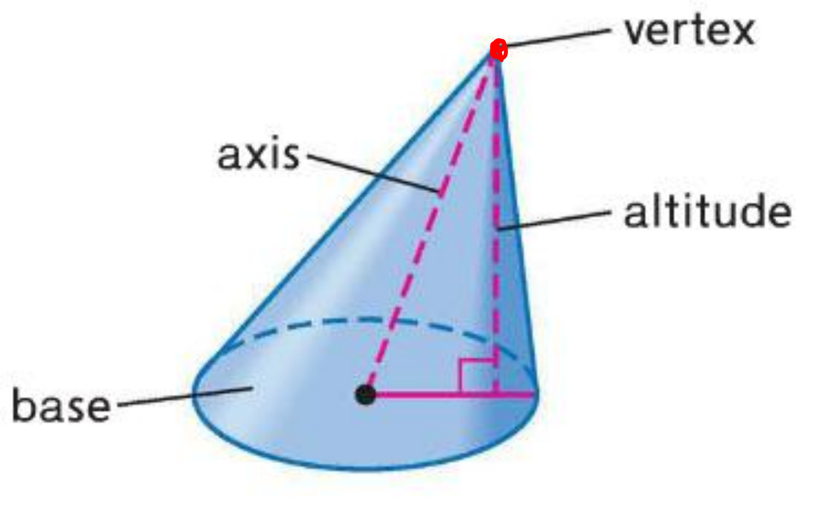




- $S = \frac{1}{2}P\mathcal{L} + B$; P = 4 * 5 = 20
- $B = \frac{1}{2}PA = \frac{1}{2}(20)(2.75) = 27.5$
- $\mathcal{L} = \sqrt{2.75^2 + 7^2} = 7.5$
- $S = \frac{1}{2}(20)(7.5) + 27.5$
- $S = 102.5$

# LATERAL AREA AND SURFACE AREA OF CONES



Right Cone



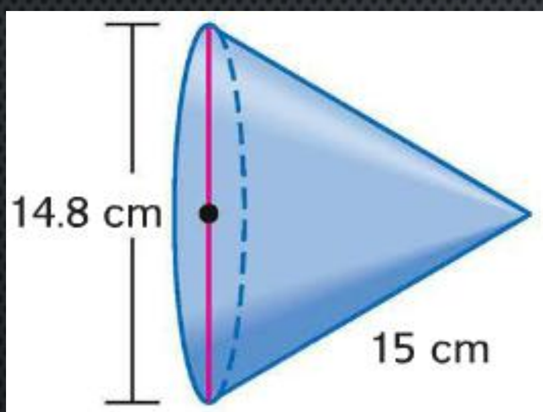
Oblique Cone

# Lateral and Surface Area of a Cone

- The lateral area $L$ of a right circular cone is $L = \pi R \mathcal{L}$, where $R$ is the radius of the base and $\mathcal{L}$ is the slant height.
- The surface area S of a right circular cone is $S = \pi R \mathcal{L} + \pi R^2$, where $R$ is the radius of the base and $\mathcal{L}$ is the slant height.

# EXAMPLES

- FIND THE LATERAL AND SURFACE AREA OF A CONE WITH A DIAMETER OF 14.8 CENTIMETERS AND A SLANT HEIGHT OF 15 CENTIMETERS.




$L = \pi r l$

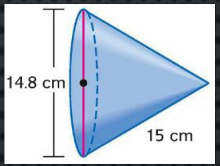
$= \pi(7.4)(15)$

$S = \pi r l + \pi r^2$

$S = \pi(7.4)(15) + \pi(7.4)^2$

# EXAMPLES

- Find the lateral and surface area of a cone with a diameter of 14.8 centimeters and a slant height of 15 centimeters.

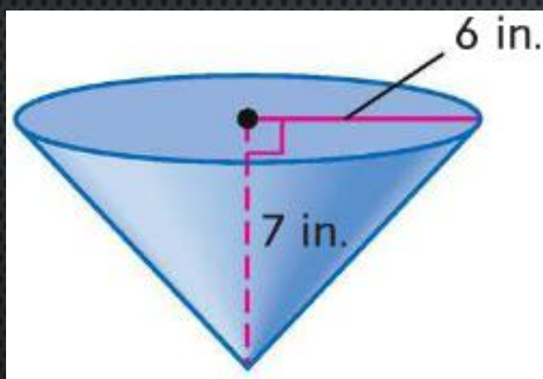



- $L = \pi R\mathcal{L}$; R = $\frac{14.8}{2} = 7.4$;
- L = $\pi(7.4)(15) = 111\pi = 348.7$

- $S = \pi R\mathcal{L} + \pi R^2$
- $S = 111\pi + \pi(7.4^2)$
- $S = 111\pi + \pi(54.76) = 165.76\pi = 520.75$

# EXAMPLES

- Find the lateral and surface areas of the cone. Round to the nearest tenth.




$L = \pi r l$

$= \pi(6)(\ )$

$S = \pi r l + \pi r^2$

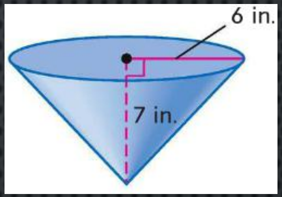
$= \pi(6)(\ ) + \pi(6)^2$

$+ 36\pi$

$6^2 + 7^2 = l^2$

# EXAMPLES

- Find the lateral and surface areas of the cone. Round to the nearest tenth.




- $L = \pi R\mathcal{L}$; R = 6;
- $\mathcal{L} = \sqrt{6^2 + 7^2} = 9.2$
- L = $\pi(6)(9.2) = 55.2\pi = 173.4$

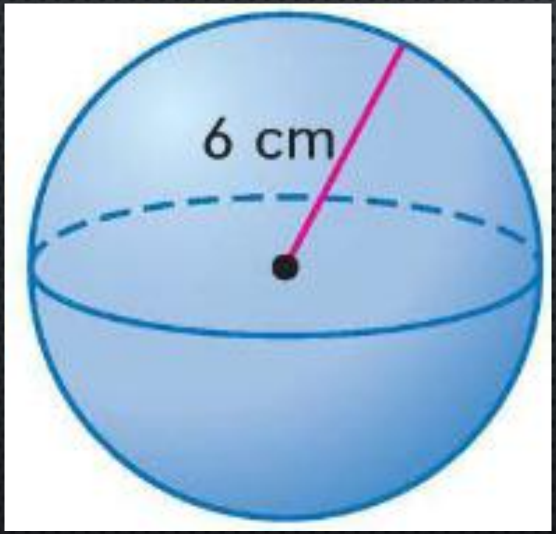
- $S = \pi R\mathcal{L} + \pi R^2$
- $S = 55.2\pi + \pi(6^2)$
- $S = 55.2\pi + \pi(36) = 91.2\pi = 286.5$

# Surface Area of a Sphere

- The surface area $S$ of a sphere is $S = 4\pi r^2$, where $r$ is the radius.

# EXAMPLES

- Find the surface area of the sphere to the nearest tenth.



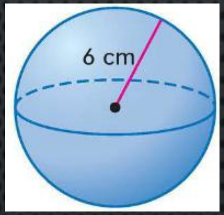

$S = 4\pi r^2$

$= 4\pi(6)^2$

$= 144\pi$

# EXAMPLES

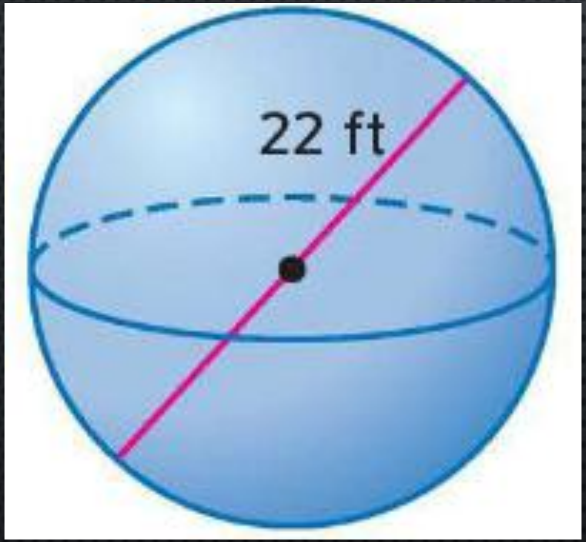
- FIND THE SURFACE AREA OF THE SPHERE TO THE NEAREST TENTH.




- $S = 4\pi r^2$; r = 6 → $4\pi(6)^2$
- $S = 144\pi = 452.4$

# EXAMPLES

- FIND THE SURFACE AREA OF THE SPHERE TO THE NEAREST TENTH.




$S = 4\pi r^2$

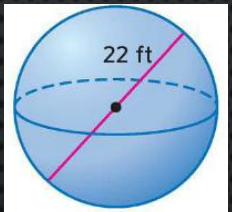
$= 4\pi(11)^2$

$= 484\pi$

# EXAMPLES

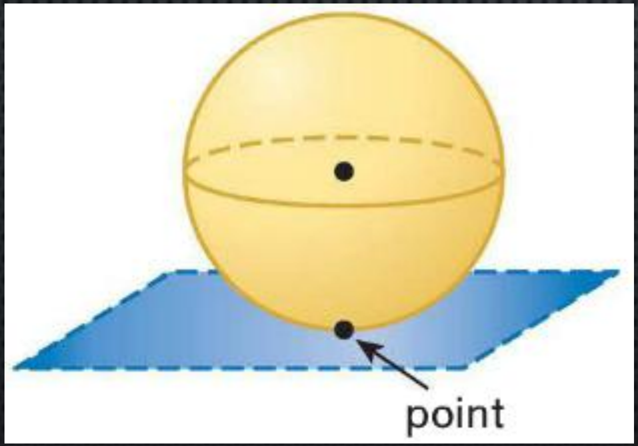
- FIND THE SURFACE AREA OF THE SPHERE TO THE NEAREST TENTH.

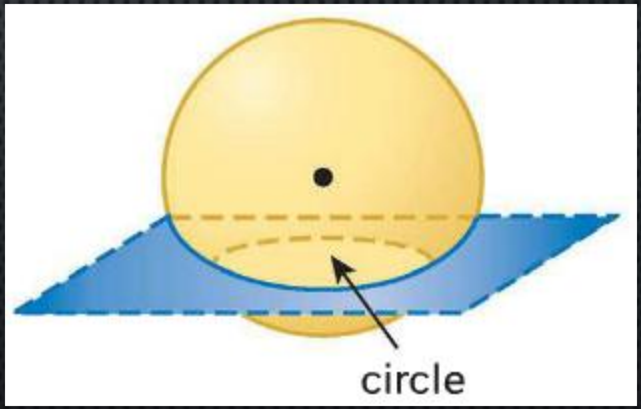
- $S = 4\pi R^2$; R $= \frac{22}{2} = 11 \rightarrow S = 4\pi 11^2$
- $S = 484\pi = 1520.5$



# SPHERES

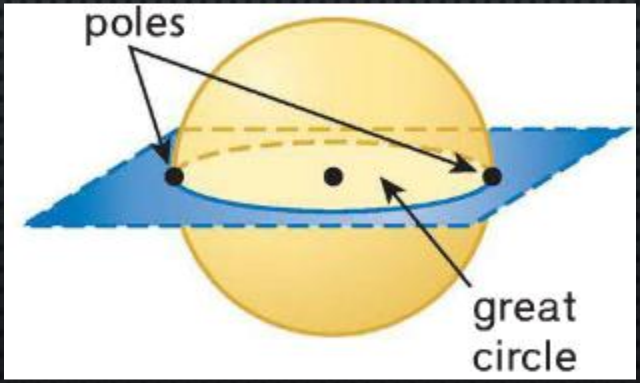
- A plane can intersect a sphere in a point or in a circle.



# Spheres

- If the circle contains the center of the sphere, the intersection is called a great circle.
- The endpoints of a diameter of a great circle are called poles.



# Great Circle

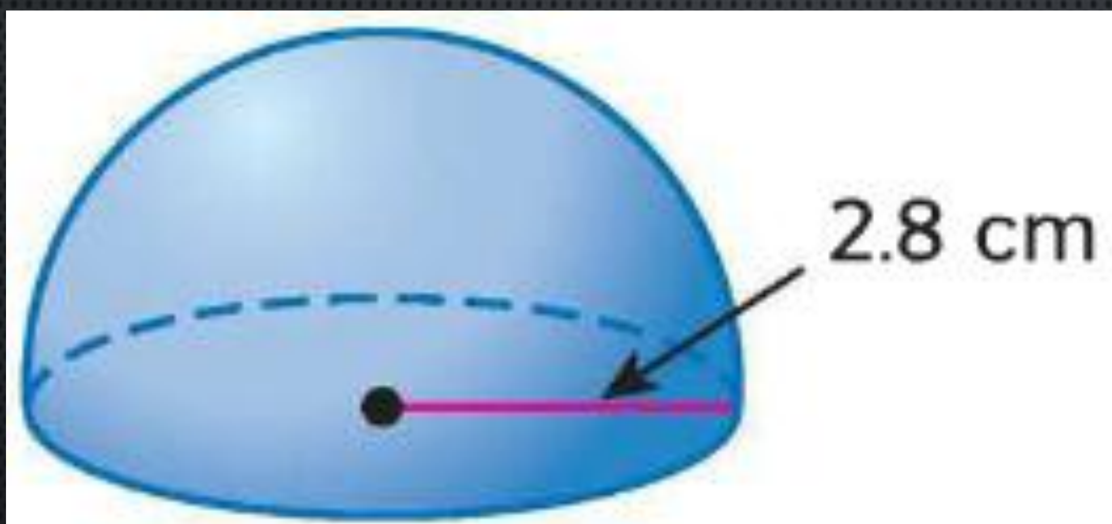
- Since a great circle has the same center as the sphere and its radii are also radii of the sphere, it is the largest circle that can be drawn on a sphere.
- It separates a sphere into two congruent halves, called hemispheres.

# EXAMPLES

$$S = 3\pi r^2$$

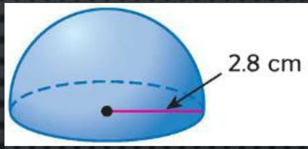
$$= 3\pi(2.8)^2$$

- Find the surface area of the hemisphere.



# EXAMPLES

- FIND THE SURFACE AREA OF THE HEMISPHERE.




- $S = 2\pi r^2 + \pi r^2$ OR $S = 3\pi r^2$
- $S = 3\pi(2.8)^2 = 3\pi(7.84)$
- $S = 23.52\pi = 73.89$

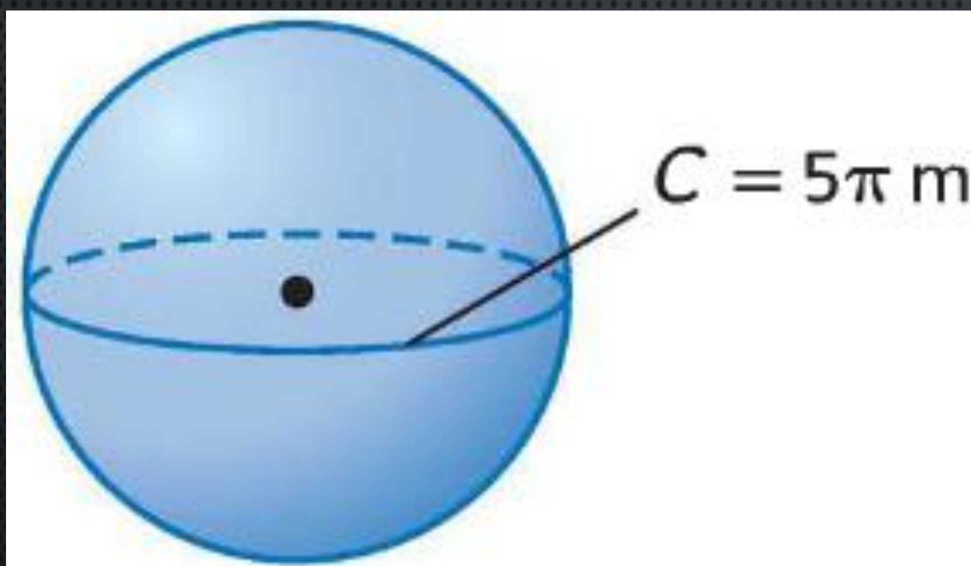
# EXAMPLES

$C = 2\pi r$

$\frac{5\pi}{2\pi} = \frac{2\pi r}{2\pi}$

$2.5 = r$

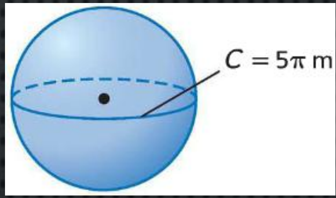
- Find the surface area of the sphere.



# EXAMPLES

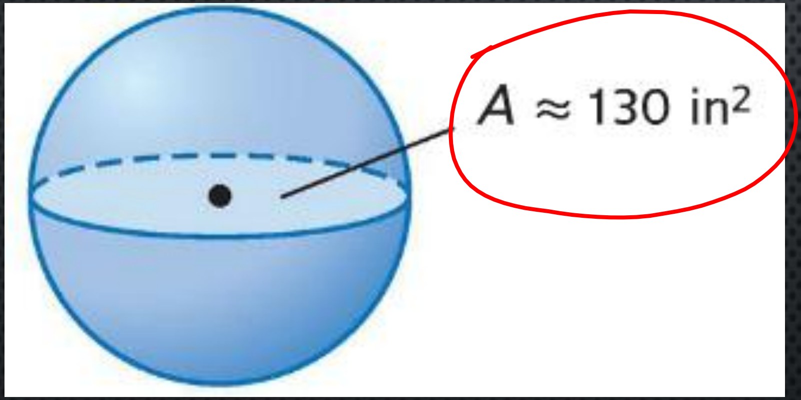
- Find the surface area of the sphere.

- $S = 4\pi R^2$; $C = 2\pi R$ → $R = \frac{C}{2\pi} = \frac{5\pi}{2\pi} = 2.5$
- $S = 4\pi(2.5)^2 = 4\pi(6.25)$
- $S = 25\pi = 78.54$



# Examples

- Find the surface area of a sphere if the area of the great circle is approximately 130 square inches.



# EXAMPLES

- FIND THE SURFACE AREA OF A SPHERE IF THE AREA OF THE GREAT CIRCLE IS APPROXIMATELY 130 SQUARE INCHES.

- $S = 4\pi R^2; \pi R^2 = 130$
- $S = 4 * 130 = 520$