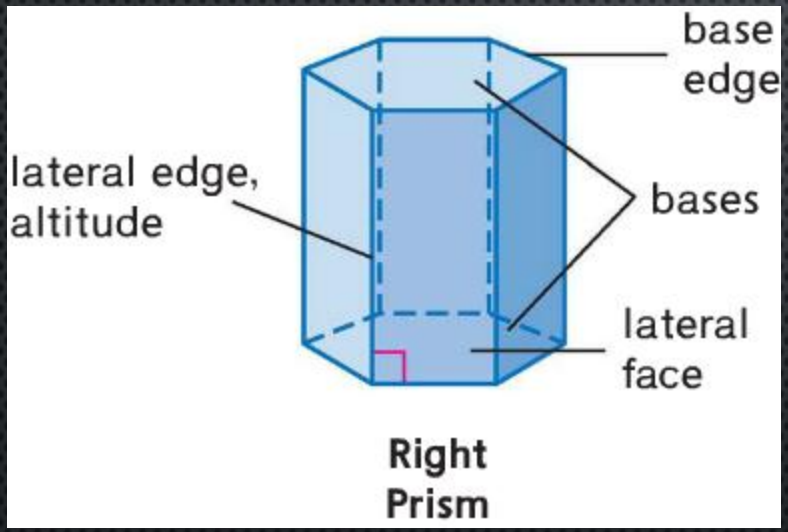
SURFACE AREA OF:

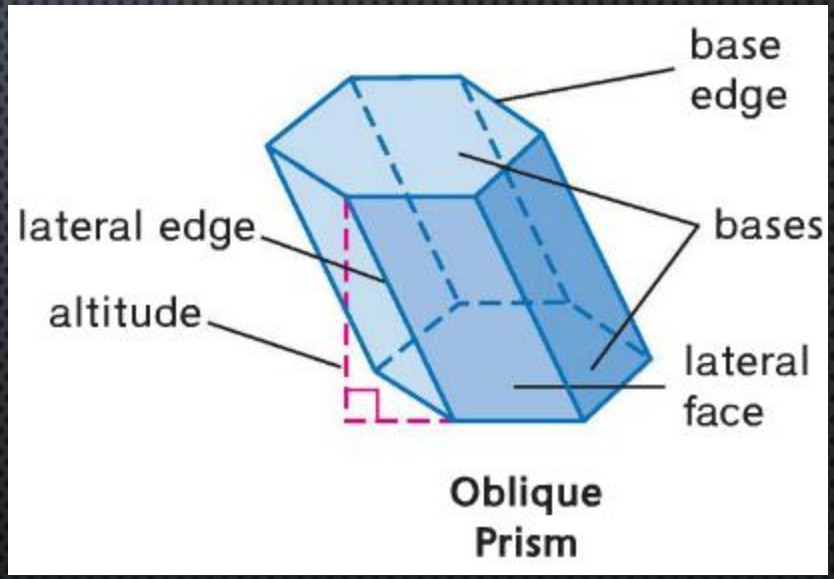
Prisms and Cylinders

Pyramids and Cones

spheres

LATERAL AREAS AND SURFACE AREAS OF PRISMS





Lateral Area of a Prism

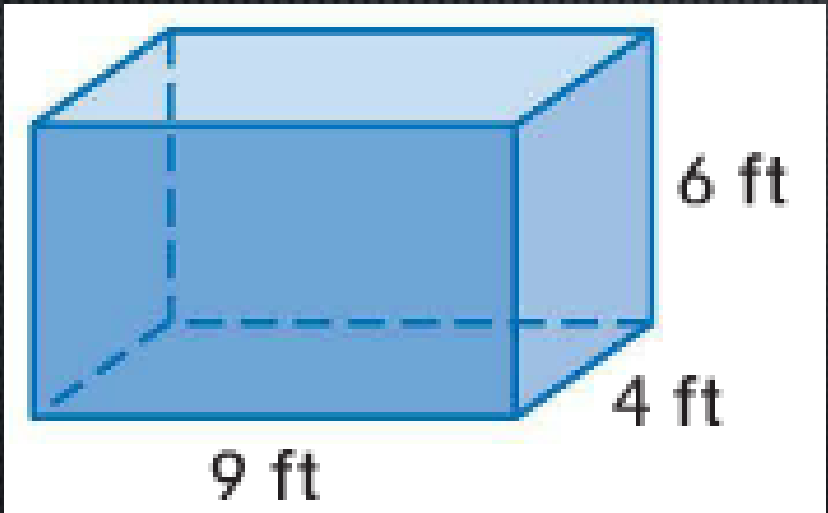
- The lateral area L of a right prism is $L=PH$, where H is the height of the prism and P is the perimeter of a base.

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

- FIND THE SURFACE AREA OF THE PRISM.



$S = L + 2B$

$= Ph + 2B$

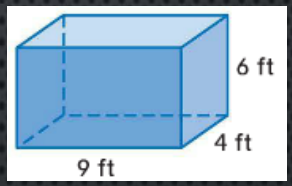
$= (26)(6) + 2(9 \cdot 4)$

$= 156 + 72$

$= 228$

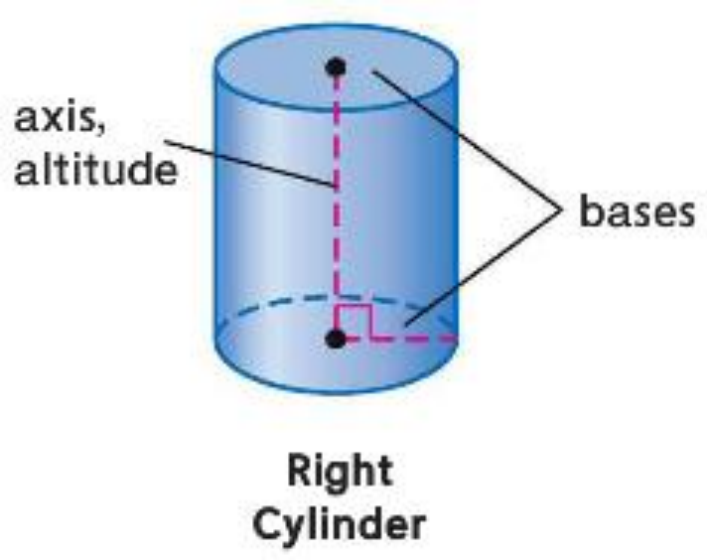
EXAMPLES

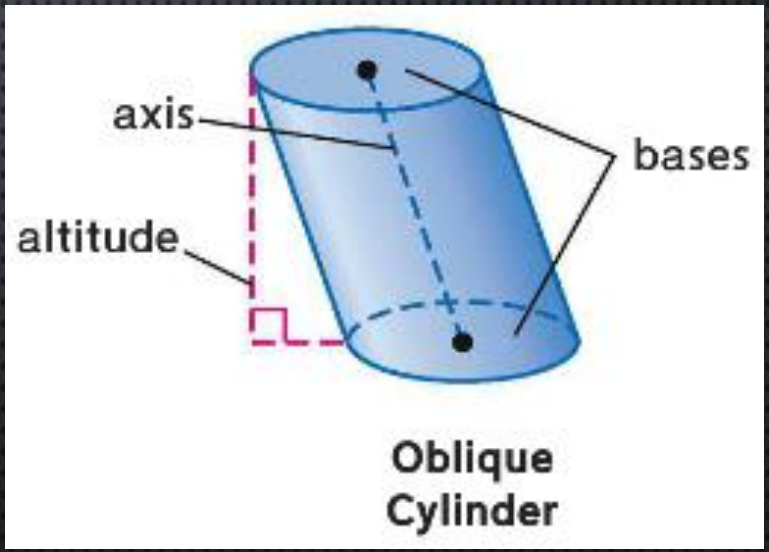
- FIND THE SURFACE AREA OF THE PRISM.



- $S = L + 2B$; $L = PH \rightarrow S = PH + 2B$
- $P = 2L + 2B = 2(4) + 2(6) = 8 + 12 = 20$
- $B = 6 * 4 = 24$; $H = 9$
- $S = (20)(9) + 2(24)$
- $= 180 + 48$
- $= 228$

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

  $S = 2\pi RH + 2\pi R^2$,

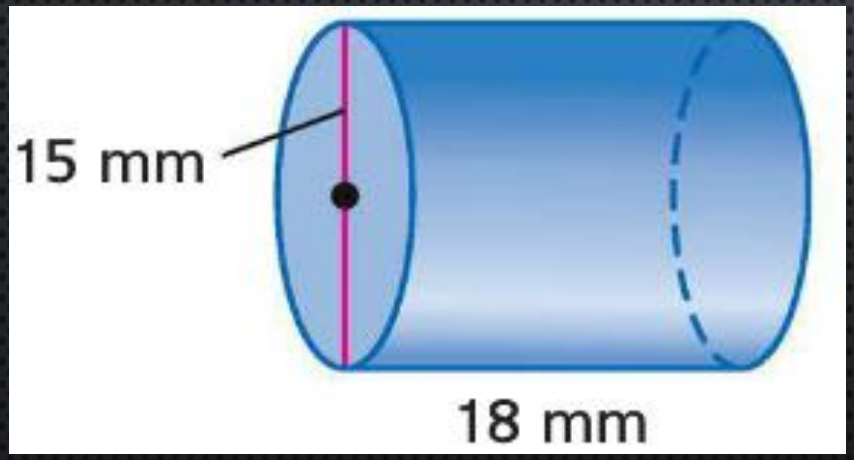
  L + 2B

  WHERE R IS THE RADIUS OF A BASE AND H IS THE HEIGHT.

EXAMPLES

$L = 2\pi rh = 2\pi(15)(18)$
$= \pi(15)(18)$
$= 270\pi$
$= 848.2$

- FIND THE LATERAL AREA AND THE SURFACE AREA OF THE CYLINDER. ROUND TO THE NEAREST TENTH.



$S = 270\pi + 2\pi r^2$
$= 270\pi + 2\pi(75)^2$
$= 270\pi + 1125\pi$
$= 382.5\pi = 1170.2$

EXAMPLES

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

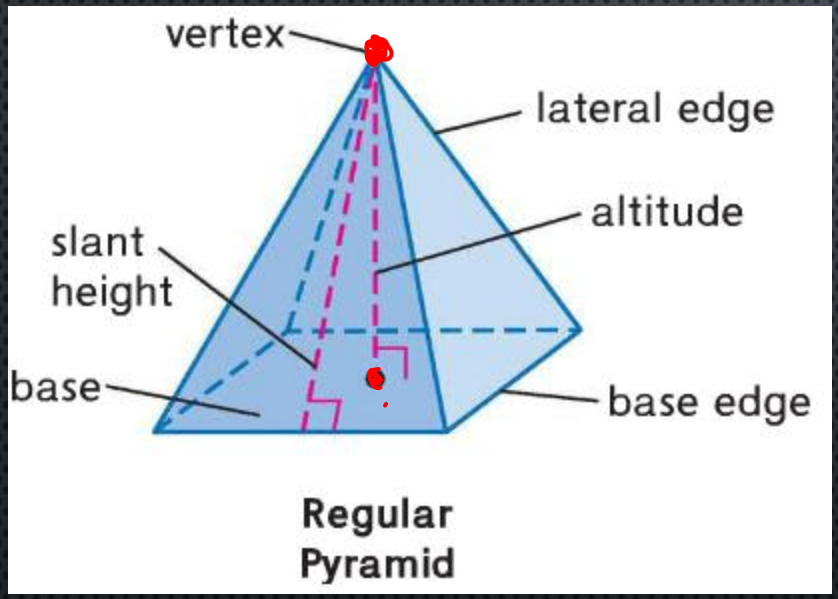
- $L = 2\pi RH$; $R = \frac{15}{2} = 7.5$, $H = 18$
- $L = 2\pi(7.5)(18) = 270\pi = 848.2$

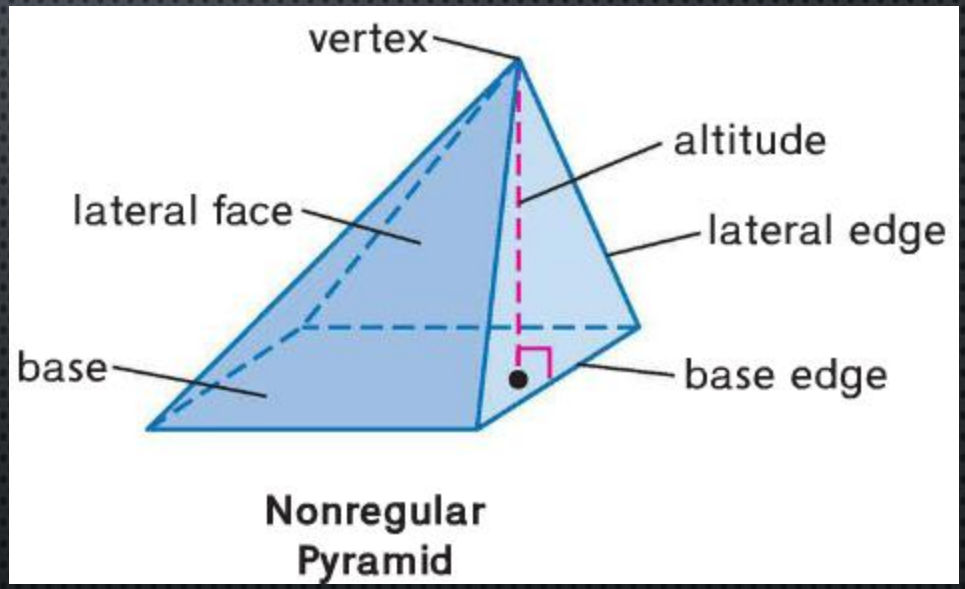
- $S = L + 2B$; $B = \pi R^2$
- $S = 270\pi + 2\pi(7.5^2)$
- $S = 270\pi + 112.5\pi = 382.5\pi = 1201.66$

- Find the lateral area and the surface area of the cylinder. Round to the nearest tenth.
- $L = 2\pi RH$; $R = \frac{15}{2} = 7.5$, $H = 18$
- $L = 2\pi(7.5)(18) = 270\pi = 848.2$
- $S = L + 2B$; $B = \pi R^2$
- $S = 270\pi + \pi(7.5^2)$
- $S = 270\pi + 56.25\pi = 326.25\pi = 1024.9$


Slant
height

PYRAMIDS


vertex
lateral edge
altitude
slant height
base
base edge
Regular Pyramid


vertex
altitude
lateral face
lateral edge
base
base edge
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 ℓ is the slant height.

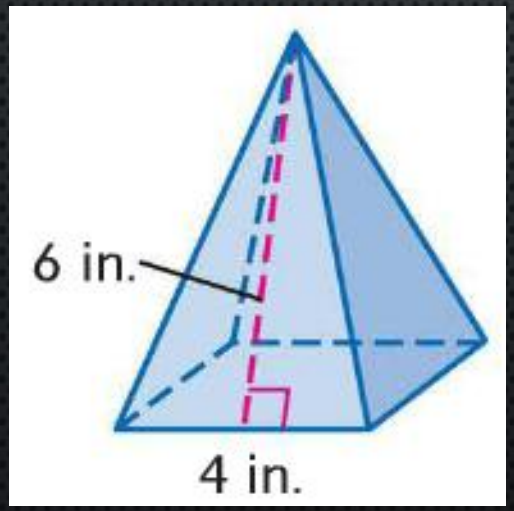
EXAMPLES

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

$= \frac{1}{2}(16)(6)$

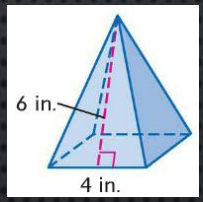
$= 48$

- FIND THE LATERAL AREA OF THE SQUARE PYRAMID.



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 $S = \frac{1}{2}P\ell + B$, where P is the perimeter of the base, ℓ is the slant height, and B is the area of the base.

EXAMPLES

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

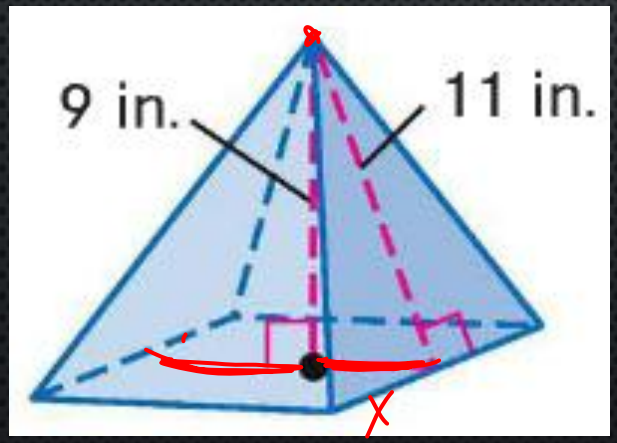
$x^2 + 81 = 121$

$-81 \quad -81$

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

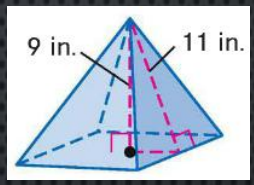
$x = \pm\sqrt{40}$

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



EXAMPLES

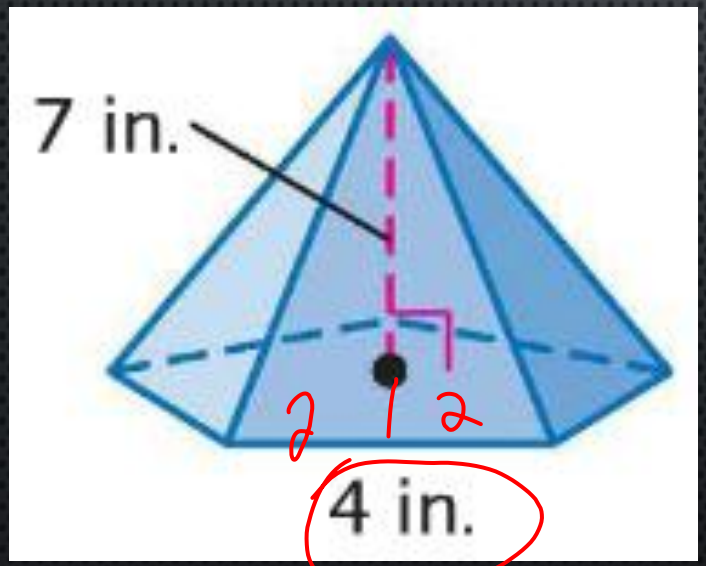
- Find the surface area of the pyramid to the nearest tenth.



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

EXAMPLES

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



$A = 14$

$A = \frac{1}{2}(20)(1.4)$

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

540°

$\tan\theta = \frac{o}{a}$

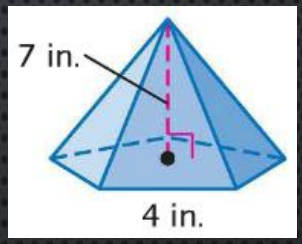
$\tan 36 = \frac{2}{a}$

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

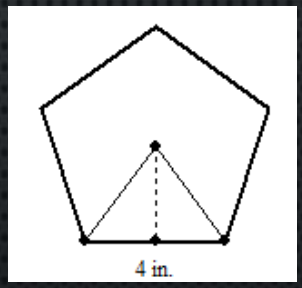
$= 2.75$

EXAMPLES

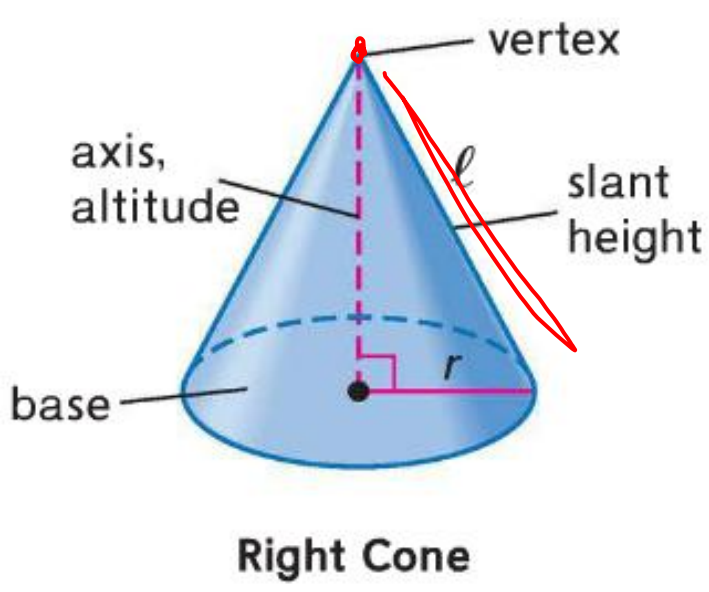
- FIND THE SURFACE AREA OF THE REGULAR PYRAMID TO THE NEAREST TENTH.

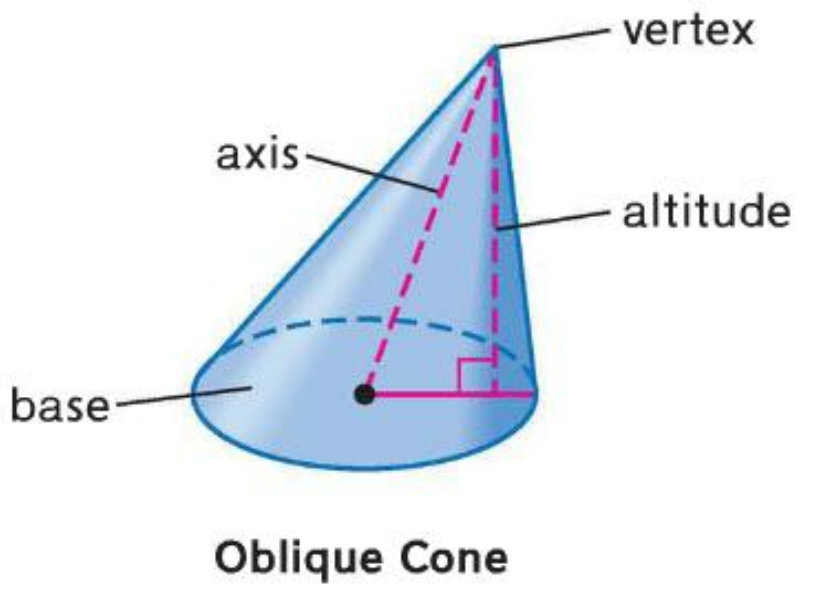


- $S = \frac{1}{2}P\ell + B$; $P = 4 * 5 = 20$
- $B = \frac{1}{2}PA = \frac{1}{2}(20)(2.75) = 27.5$
- $\ell = \sqrt{2.75^2 + 7^2} = 7.5$
- $S = \frac{1}{2}(20)(7.5) + 27.5$
- $S = 102.5$



LATERAL AREA AND SURFACE AREA OF CONES



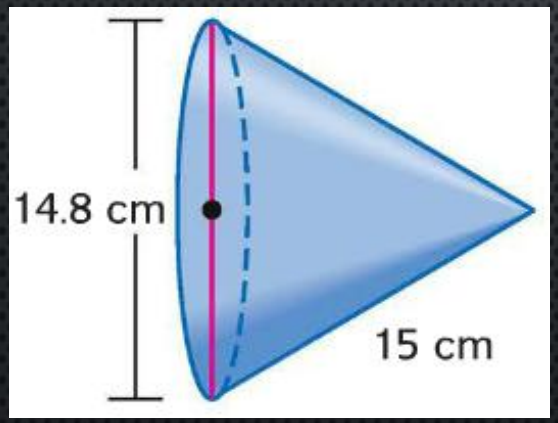


LATERAL AND SURFACE AREA OF A CONE

- THE LATERAL AREA L OF A RIGHT CIRCULAR CONE IS $L = \pi R\ell$, WHERE R IS THE RADIUS OF THE BASE AND ℓ IS THE SLANT HEIGHT.
- THE SURFACE AREA S OF A RIGHT CIRCULAR CONE IS $S = \pi R\ell + \pi R^2$, WHERE R IS THE RADIUS OF THE BASE AND 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.



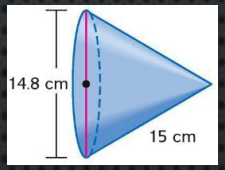
$L = \pi r l$

$= \pi(7.4)(15)$

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

EXAMPLES

- Find the lateral and surface area of a cone with a diameter of 14.8 centimeters and a slant height of 15 centimeters.
- $L = \pi R\ell$; $R = \frac{14.8}{2} = 7.4$;
- $L = \pi(7.4)(15) = 111\pi = 348.7$



- $S = \pi R\ell + \pi R^2$
- $S = 111\pi + \pi(7.4^2)$
- $S = 111\pi + \pi(54.76) = 165.76\pi = 520.75$

EXAMPLES

$a^2 + b^2 = c^2$

$6^2 + 7^2 = c^2$

$36 + 49 = c^2$

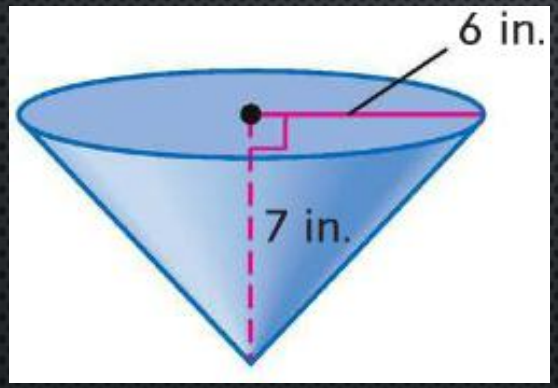
$85 = c^2$

$\sqrt{85} = \sqrt{c^2}$

$\sqrt{85} = c$

$9.2 = l$

- FIND THE LATERAL AND SURFACE AREAS OF THE CONE. ROUND TO THE NEAREST TENTH.



$L = \pi r l$

$= \pi(6)(9.2)$

$= 173.4$

$S = L + \pi r^2$

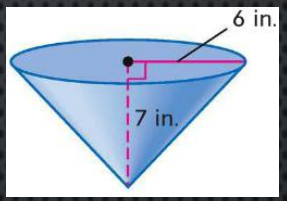
$= L + \pi(6)^2$

$= 173.4 + 36\pi$

$= 286.4$

EXAMPLES

- FIND THE LATERAL AND SURFACE AREAS OF THE CONE. ROUND TO THE NEAREST TENTH.



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

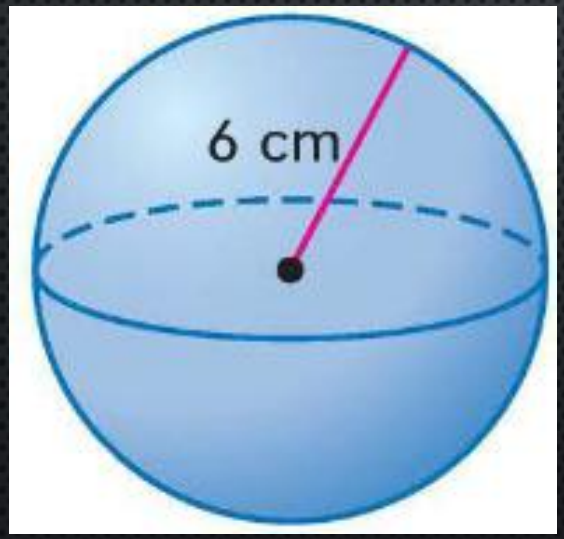
- $S = \pi R \ell + \pi R^2$
- $S = 55.2\pi + \pi(6^2)$
- $S = 55.2\pi + \pi(36) = 91.2\pi = 286.5$

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.



$S = 4\pi r^2$

$= 4\pi(6)^2$

$= 144\pi$

$= 452.4$

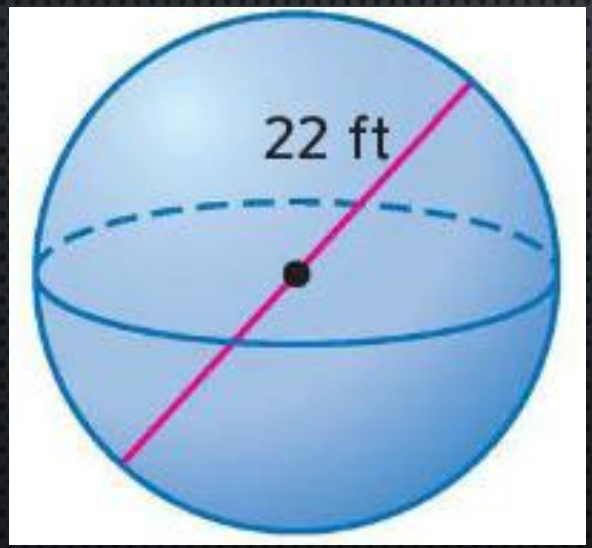
EXAMPLES

- 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.



$S = 4\pi r^2$

$= 4\pi 11^2$

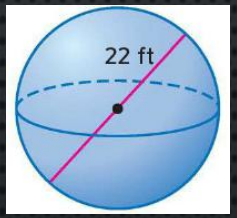
$= 484\pi$

$= 1520.5$

EXAMPLES

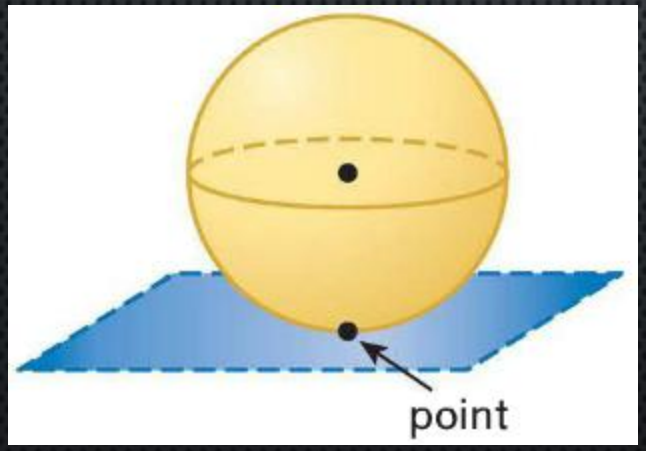
- FIND THE SURFACE AREA OF THE SPHERE TO THE NEAREST TENTH.

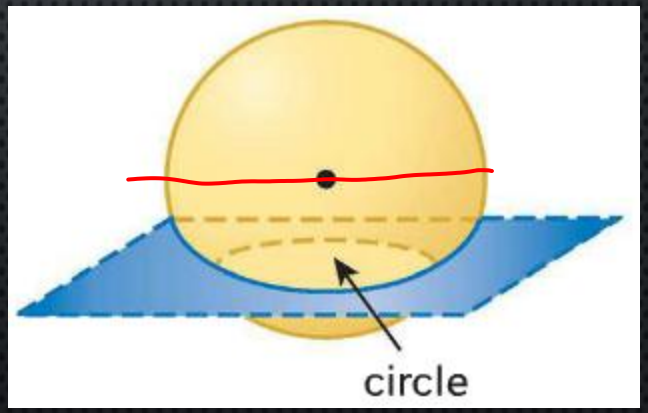
- $S = 4\pi R^2$; $R = \frac{22}{2} = 11 \rightarrow S = 4\pi 11^2$
- $S = 484\pi = 1520.5$



SPHERES

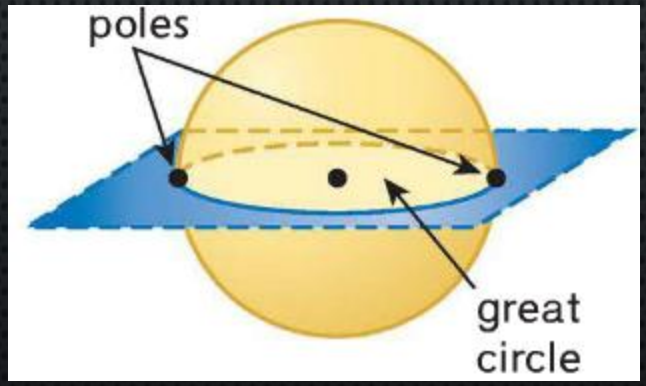
- A PLANE CAN INTERSECT A SPHERE IN A POINT OR IN A CIRCLE.





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

$$S = \frac{4\pi r^2}{2} + \pi r^2$$

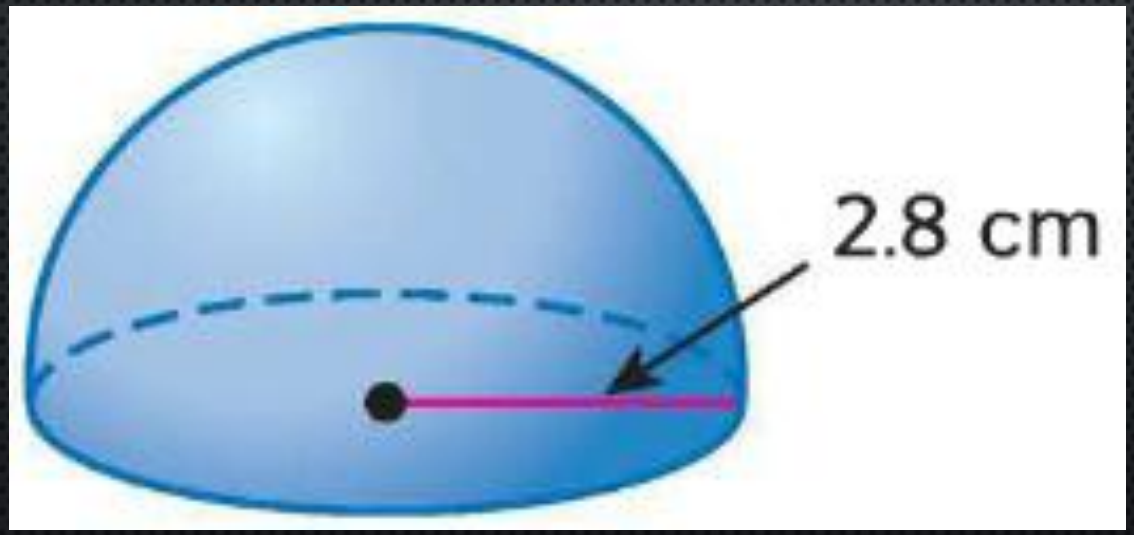
$$= 2\pi r^2 + \pi r^2$$

$$= 3\pi r^2$$

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

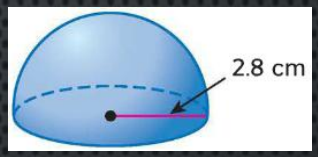
$$=$$

- FIND THE SURFACE AREA OF THE HEMISPHERE.



EXAMPLES

- FIND THE SURFACE AREA OF THE HEMISPHERE.



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

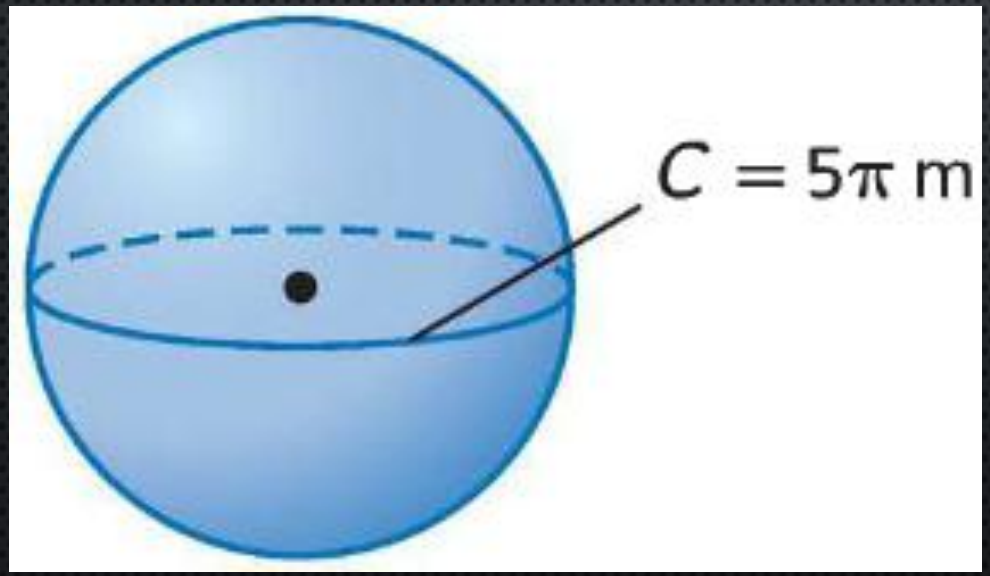
EXAMPLES

$C = 2\pi r$

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

$2.5 = r$

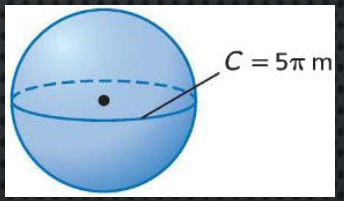
- FIND THE SURFACE AREA OF THE SPHERE.



EXAMPLES

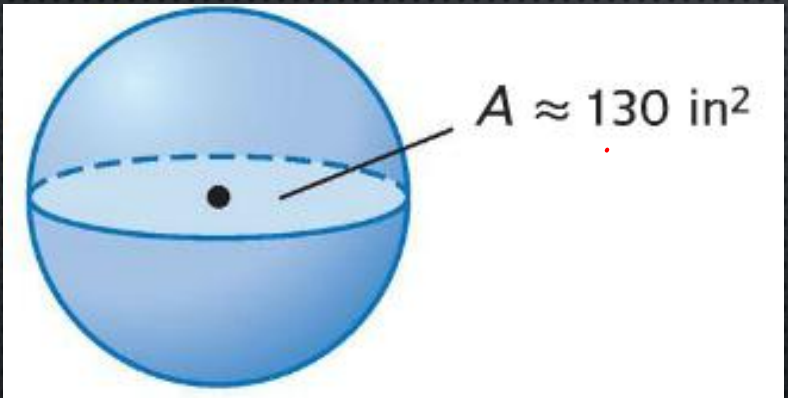
- FIND THE SURFACE AREA OF THE SPHERE.

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



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.

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