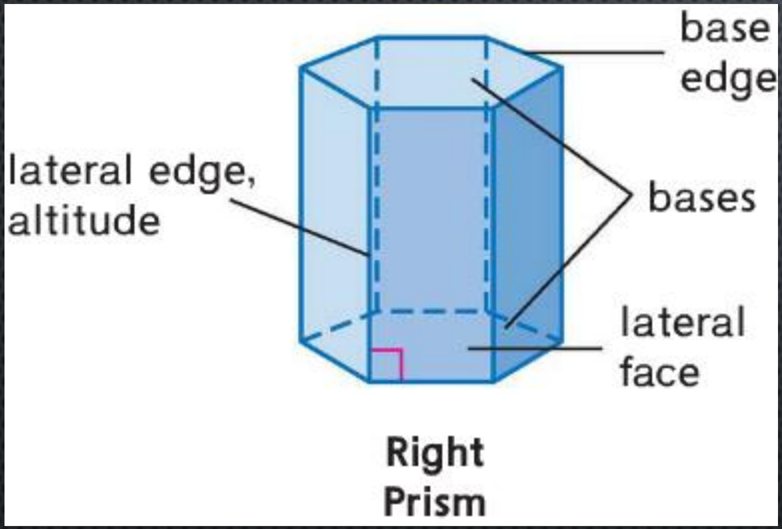
Surface Area of:

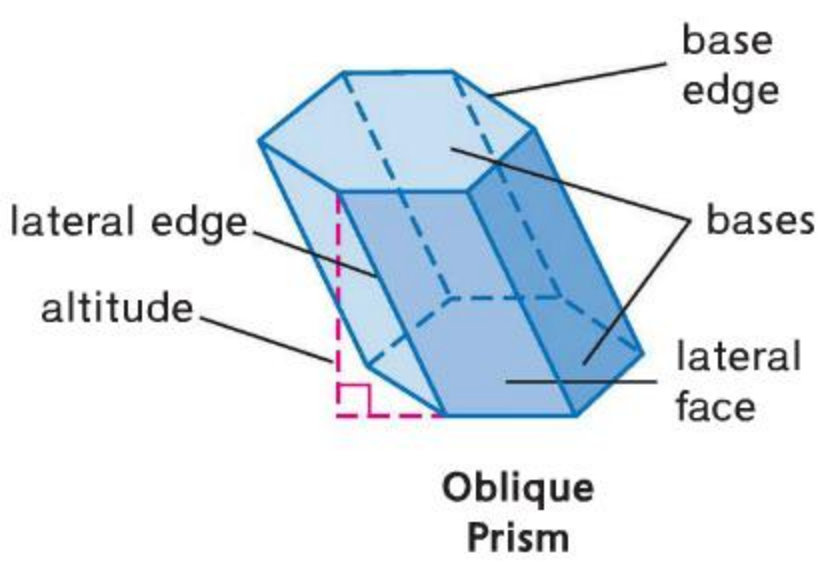
Prisms and Cylinders

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.

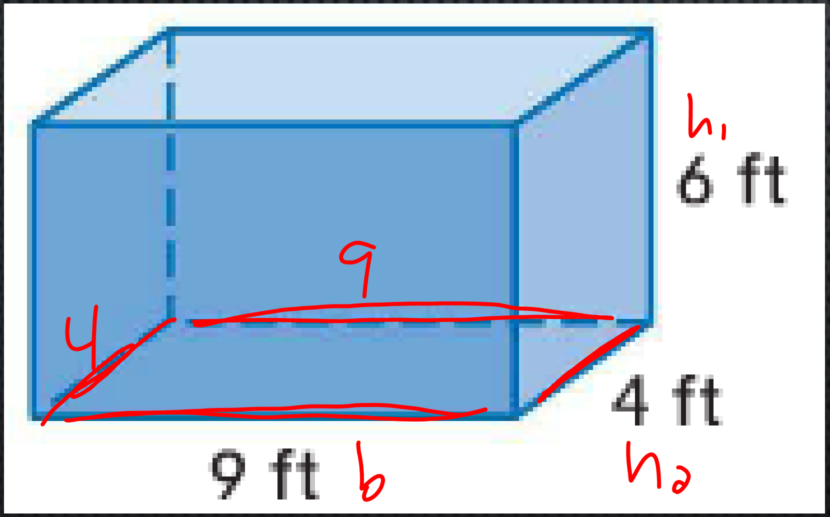
SURFACE AREA OF A PRISM

$S = Ph + 2B$

- 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.



$S = L + 2B$

$= Ph + 2B$

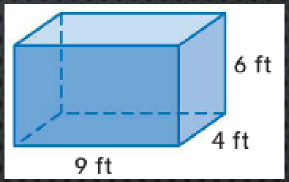
$= Ph_1 + 2(bh_2)$

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

$= 228$

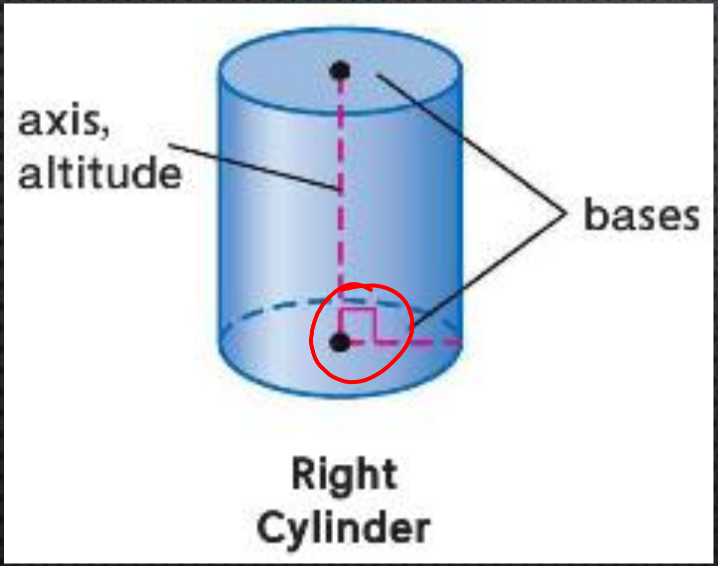
EXAMPLES

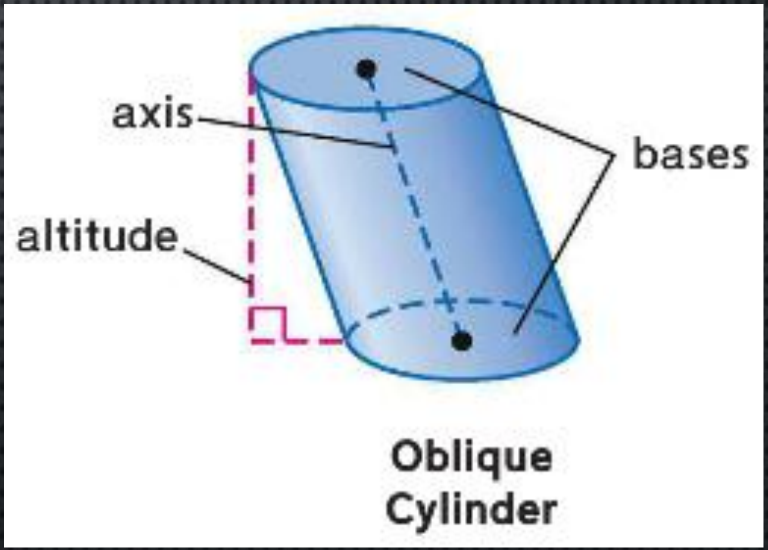
- Find the surface area of the prism.



- 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

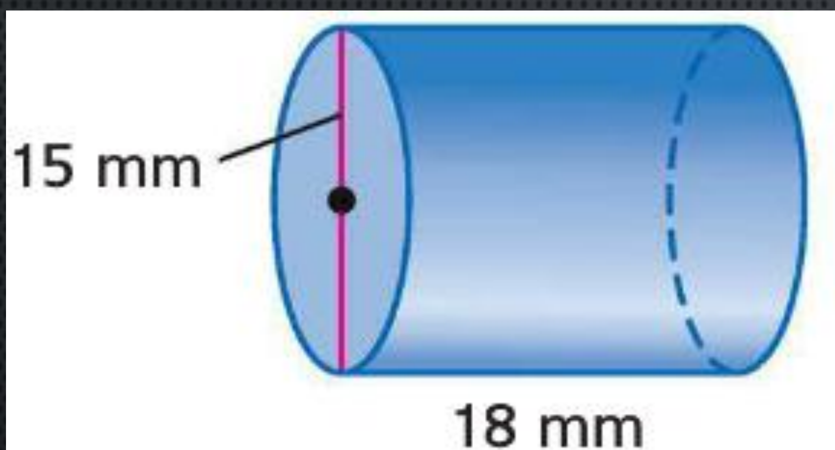
- The surface area S of a right cylinder is

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

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

EXAMPLES

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



$L = 2\pi r h$

$= 2\pi(7.5)(18$

$= \pi(15)(18) = 848.23$

$S = L + 2B \rightarrow$

$B = \pi r^2$

$= \pi(7.5)^2$

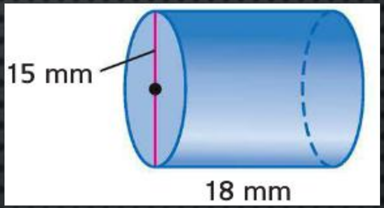
$= 162.8$

$= 848.23 + 325.6$

$= 1173.83$

EXAMPLES

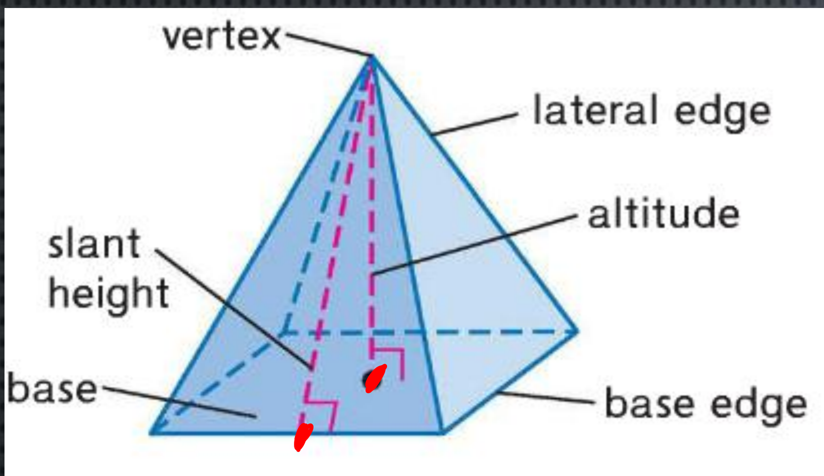
- FIND THE LATERAL AREA AND THE SURFACE AREA OF THE CYLINDER. ROUND TO THE NEAREST TENTH.



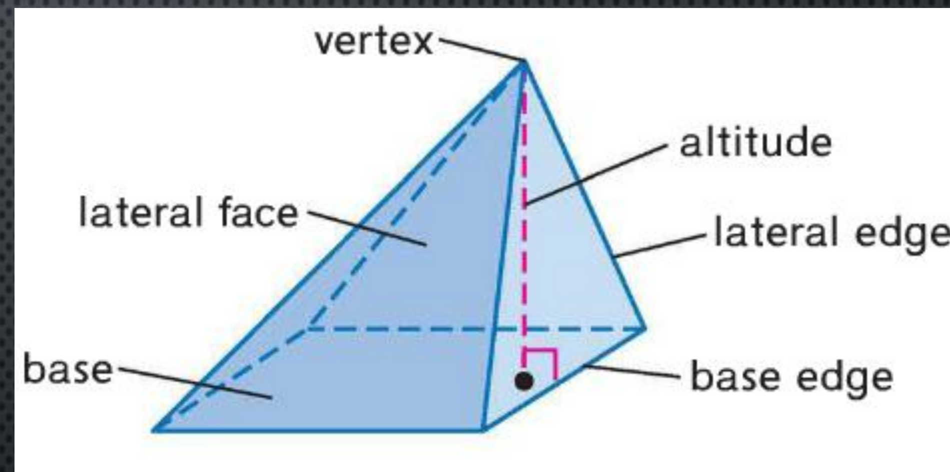
- L = 2πRH; R = $\frac{15}{2}$ = 7.5, H = 18
- L = 2π(7.5)(18) = 270π = 848.2

- S = L + 2B; B = πR^2
- S = 270π + $\pi(7.5^2)$
- S = 270π + 56.25π = 326.25π = 1024.9

PYRAMIDS



Regular Pyramid



Nonregular Pyramid

LATERAL AREA OF A REGULAR PYRAMID

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

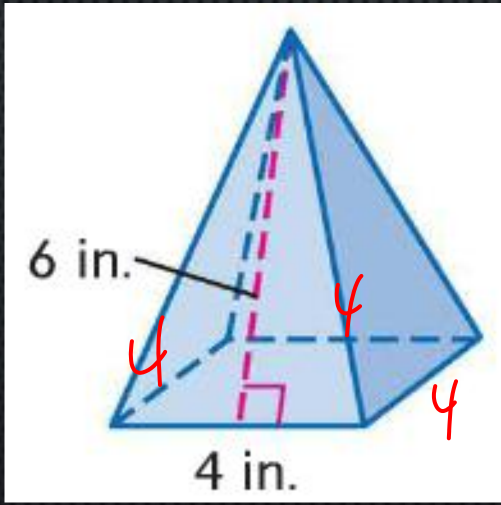
Examples

$L = \frac{1}{2}P\ell$

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

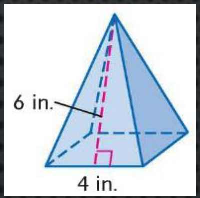
$= 48$

- Find the lateral area of the square pyramid.



EXAMPLES

- Find the lateral area of the square pyramid.



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

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.

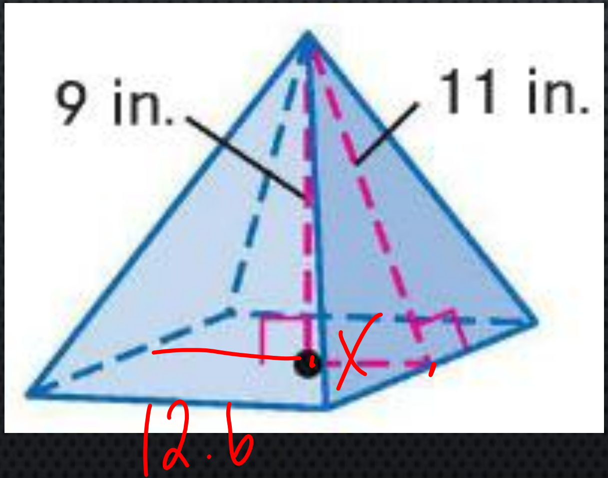
Examples

$S = L + B$

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

$= \frac{1}{2}(50.4)(11) + (158.7) = 335.9$

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



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

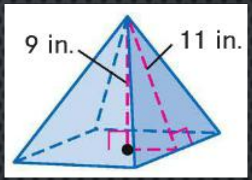
$x^2 + 81 = 121$

$x^2 = 40$

$x = \pm\sqrt{40}$

EXAMPLES

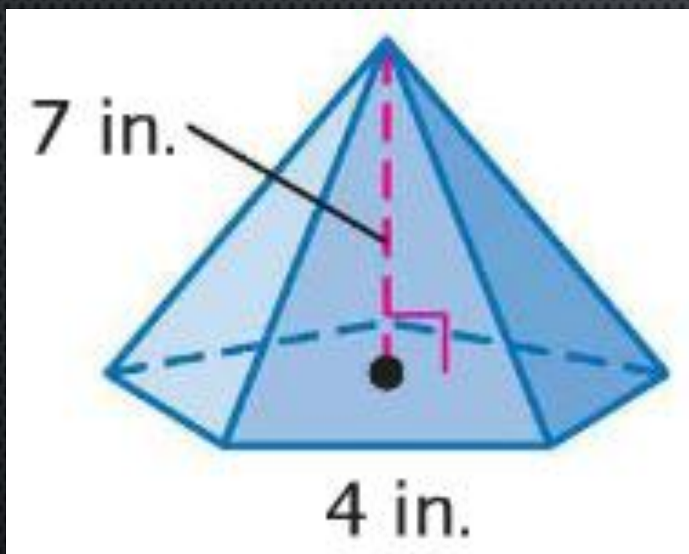
- Find the surface area of the pyramid to the nearest tenth.



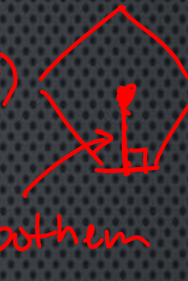
- $S = \frac{1}{2}P\ell + B$
- $11^2 - 9^2 = 40; \sqrt{40} = \frac{1}{2}s \rightarrow s = 2\sqrt{40} = 4\sqrt{10}$
- $P = 4 * 4\sqrt{10} = 16\sqrt{10}; B = (4\sqrt{10})^2 = 160$
- $S = \frac{1}{2}(16\sqrt{10})(11) + 160$
- $S = 438.3$

EXAMPLES

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



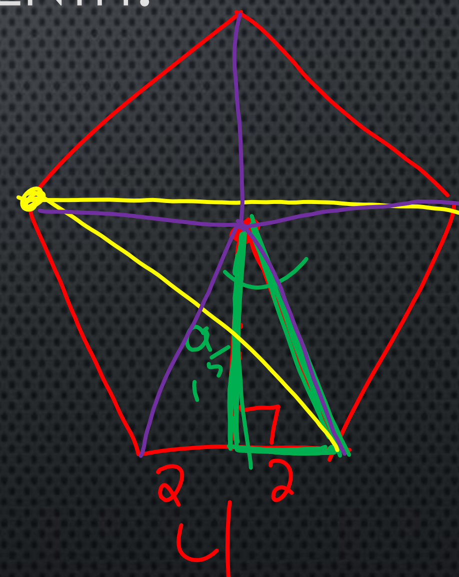
$A_{polygon} = \frac{1}{2}Pa = \frac{1}{2}(20)(1.5)$



$A = 15$ P = perimeter

a = apothem

$\tan 54 = \frac{2}{a}$



540° total

108/section

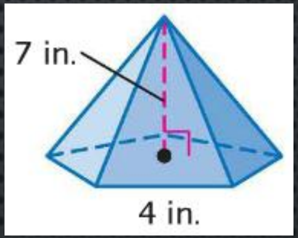
$a = \frac{2}{\tan 54}$

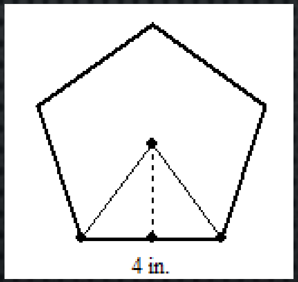
$= 1.5$

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

EXAMPLES

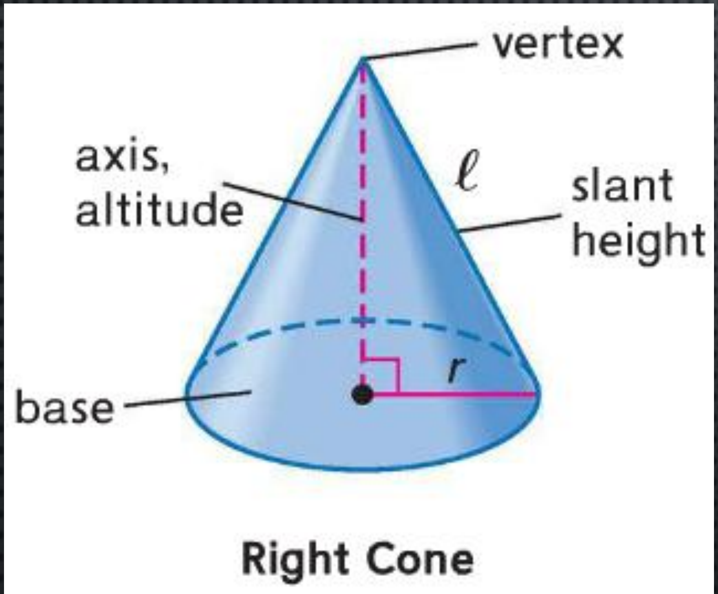
- Find the surface area of the regular pyramid to the nearest tenth.

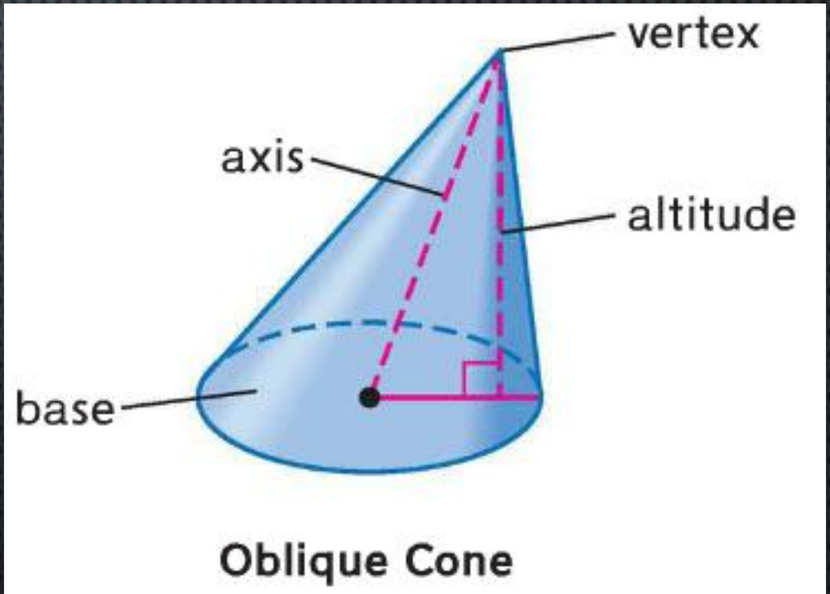




- $S = \frac{1}{2}P\mathcal{L} + B$; P = 4 * 5 = 20
- B = ½PA = ½(20)(2.75) = 27.5
- $\mathcal{L} = \sqrt{2.75^2 + 7^2} = 7.5$
- S = ½(20)(7.5) + 27.5
- S = 102.5

LATERAL AREA AND SURFACE AREA OF CONES



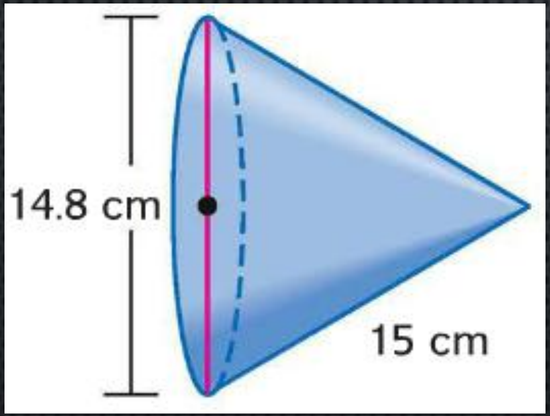


Lateral and Surface Area of a Cone

- The lateral area L of a right circular cone is $L = \pi R \mathcal{L}$, 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.

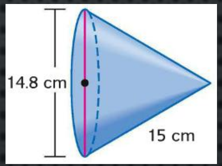
Examples

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



EXAMPLES

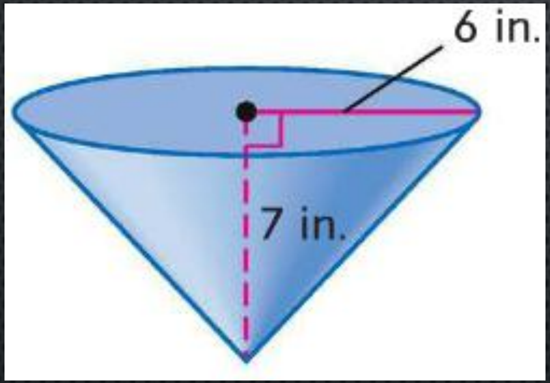
- Find the lateral and surface area of a cone with a diameter of 14.8 centimeters and a slant height of 15 centimeters.



- $L = \pi R\mathcal{L}$; 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 = $111\pi + \pi(54.76) = 165.76\pi = 520.75$

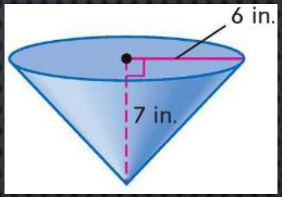
Examples

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



EXAMPLES

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



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

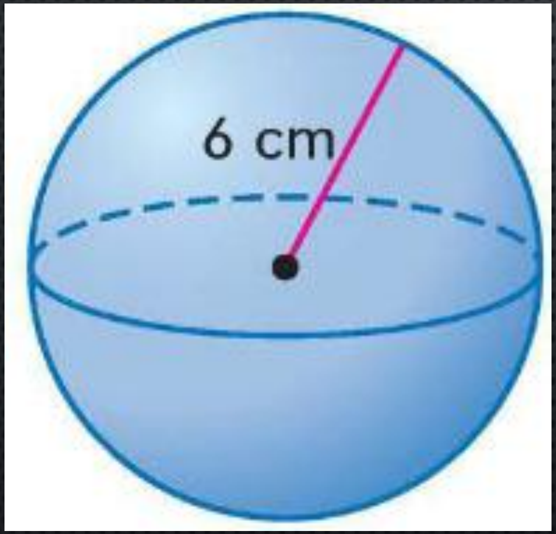
- $S = \pi R \mathcal{L} + \pi R^2$
- $S = 55.2\pi + \pi(6^2)$
- $S = 55.2\pi + \pi(36) = 91.2\pi = 286.5$

SURFACE AREA OF A SPHERE

- THE SURFACE AREA S OF A SPHERE IS $S = 4\pi r^2$, WHERE r IS THE RADIUS.

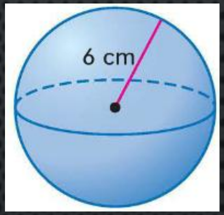
EXAMPLES

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



EXAMPLES

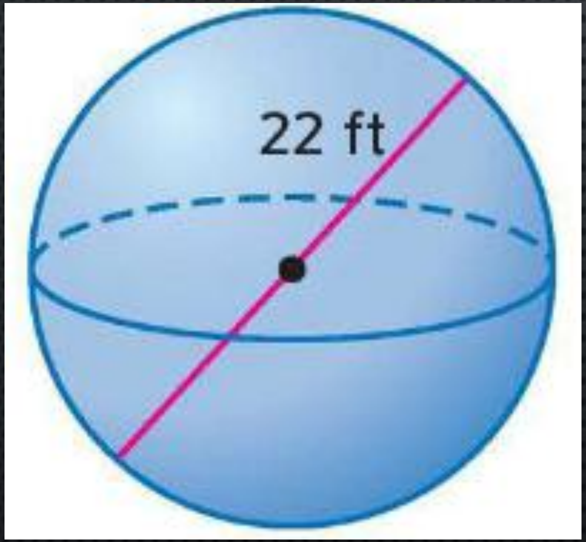
- FIND THE SURFACE AREA OF THE SPHERE TO THE NEAREST TENTH.



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

Examples

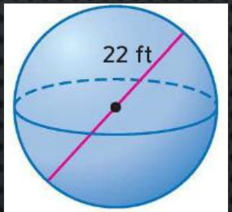
- Find the surface area of the sphere to the nearest tenth.



Examples

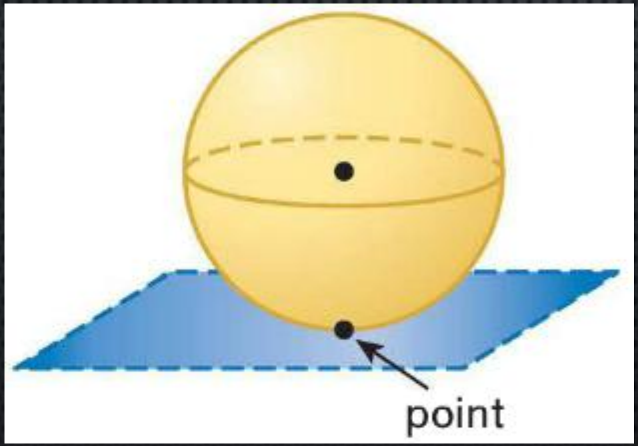
- Find the surface area of the sphere to the nearest tenth.

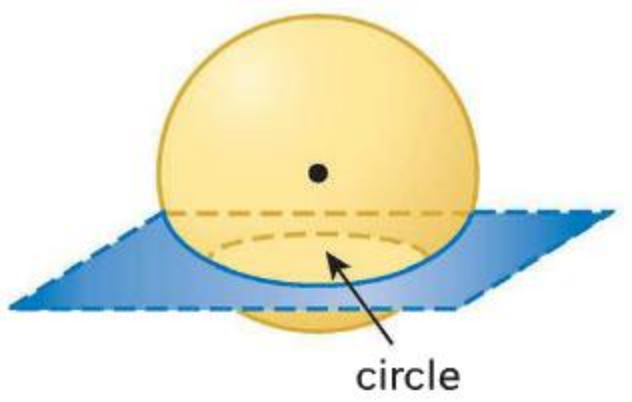
- $S = 4\pi R^2$; R $= \frac{22}{2} = 11 \rightarrow S = 4\pi 11^2$
- $S = 484\pi = 1520.5$



Spheres

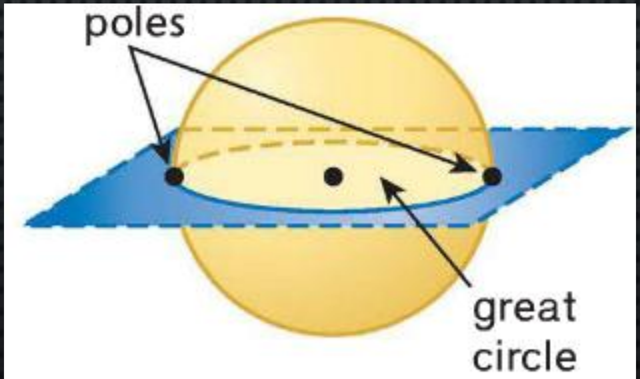
- A plane can intersect a sphere in a point or in a circle.





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.

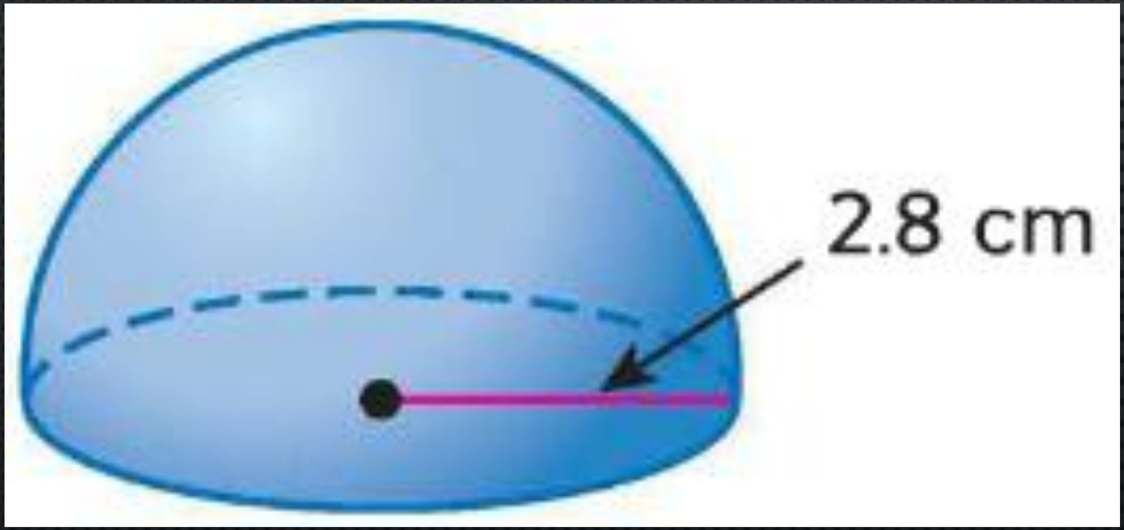


GREAT CIRCLE

- 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.

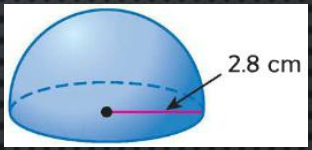
Examples

- Find the surface area of the hemisphere.



EXAMPLES

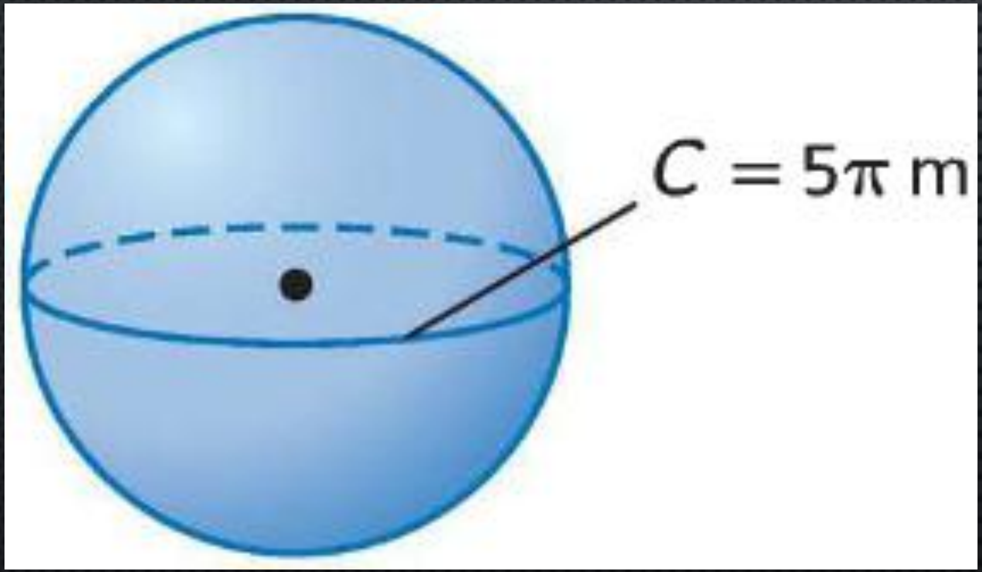
- FIND THE SURFACE AREA OF THE HEMISPHERE.



- $S = 2\pi r^2 + 2\pi r$ OR $S = 2\pi r(r + 1)$
- $S = 2\pi(2.8)(2.8 + 1) = 2\pi(2.8)(3.8)$
- $S = 21.28\pi = 66.85$

Examples

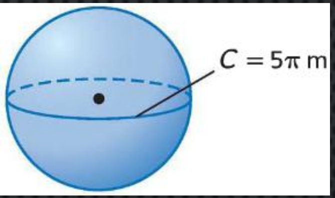
- Find the surface area of the sphere.



EXAMPLES

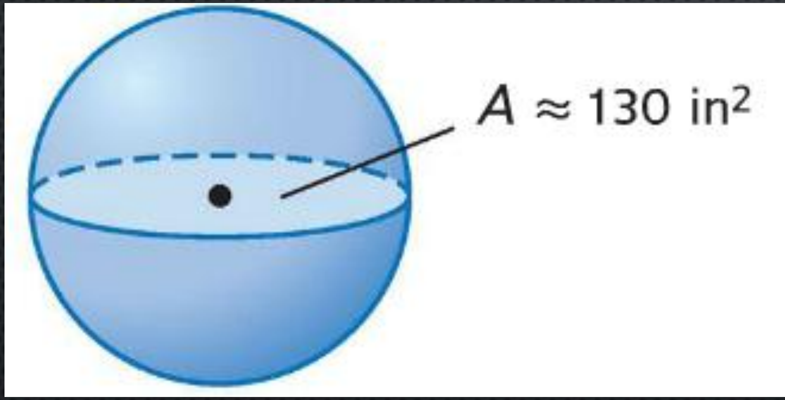
- FIND THE SURFACE AREA OF THE SPHERE.

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



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.

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