Volume of:

Prisms and Cylinders

Pyramids and Cones

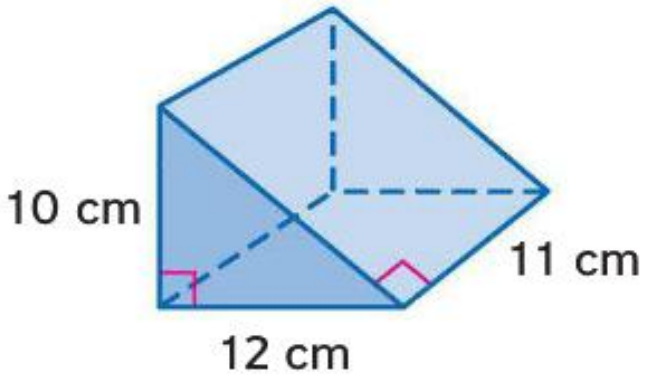
Spheres

Volume of Prisms and Cylinders

* The volume V of a prism is $V = Bh$, where B is the area of a base and h is the height of the prism.

Examples

* Find the volume of the prism.



$V = Bh$

$= \frac{bh_1}{2} h_2$

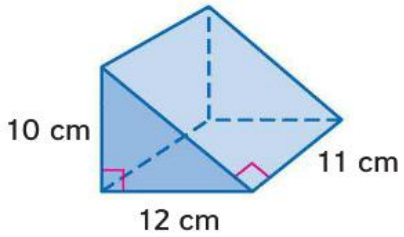
$= \frac{lw}{2} h$

$= \frac{10 \cdot 12}{2} \cdot 11$

$= 660$

Examples

* Find the volume of the prism.



* $V = Bh$; $B = \frac{1}{2}bh = \frac{1}{2}(10)(12) = 60$; $h = 11$
* $V = 60 * 11 = 660$

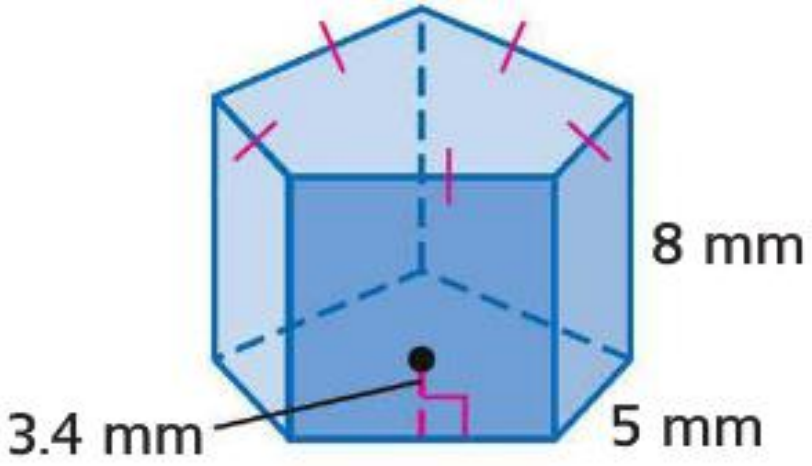
Examples

$V = Bh$

$= \frac{1}{2}Pah$

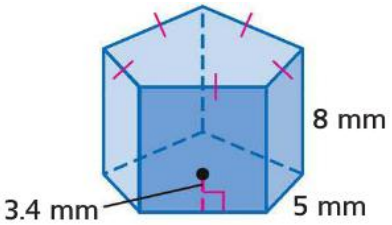
* Find the volume of the prism.

$= \frac{1}{2}(25)(3.4)(8)$



Examples

* Find the volume of the prism.



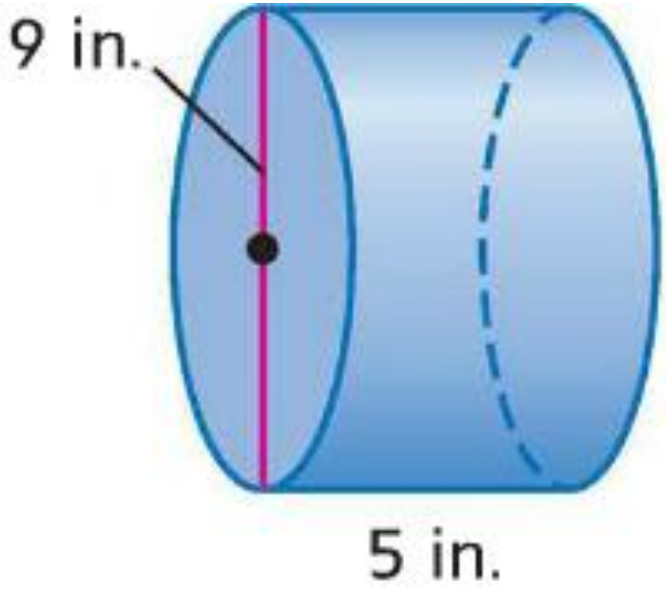
* $V = Bh$
* $B = \frac{1}{2}Pa = \frac{1}{2}(5*5)(3.4) = 42.5$
* $V = (42.5)(8) = 340$

Volume of a Cylinder

* The volume V of a cylinder is $V = Bh$ or $V = \pi r^2 h$, where B is the area of the base, h is the height of the cylinder, and r is the radius of the base.

Examples

* Find the volume of the cylinder.

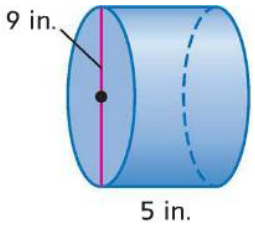


$V = \pi r^2 h$

$= \pi (4.5)^2 (5)$

Examples

* Find the volume of the cylinder.



* $V = \pi r^2 h;\ h = 5$
* $r = \frac{9}{2} = 4.5$
* $V = \pi(4.5^2)(5) = 101.25\pi = 318.1$

Volume of a Pyramid

* The volume of a pyramid is $V = \frac{1}{3}Bh$, where B is the area of the base and h is the height of the pyramid.

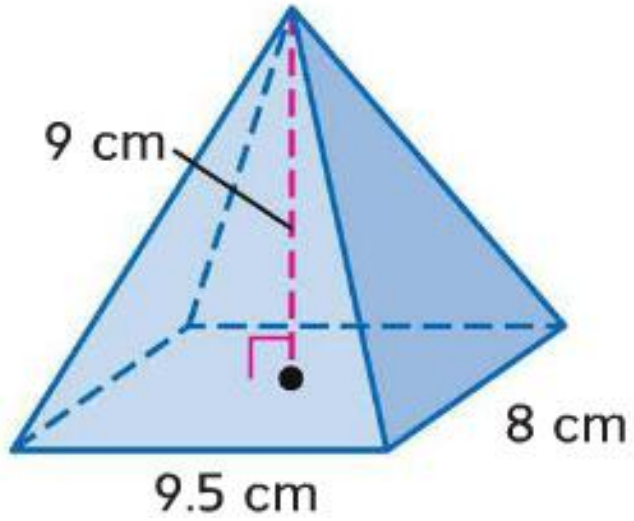
Examples

$V = \frac{Bh}{3}$

$= \frac{lwh}{3}$

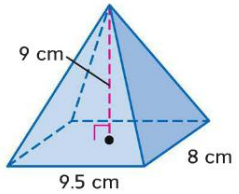
$= \frac{9.5 \cdot 8 \cdot 9}{3}$

* Find the volume of the pyramid.



Examples

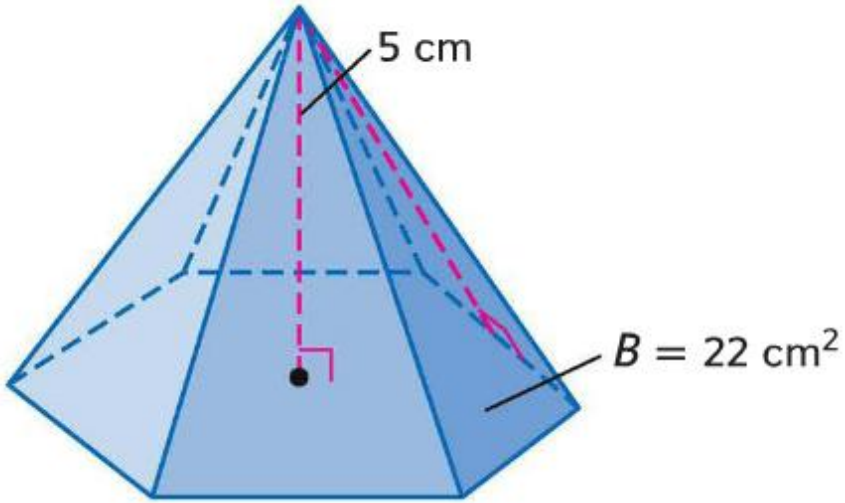
* Find the volume of the pyramid.



* $V = \frac{1}{3}Bh$
* $B = 9.5 * 8 = 76; h = 9$
* $V = \frac{1}{3}(76)(9) = 228$

Examples

* Find the volume of the pyramid.

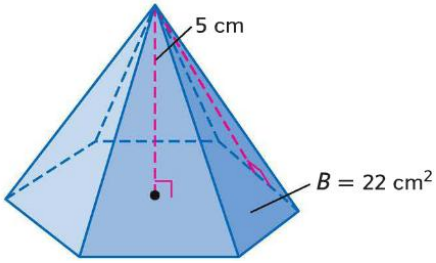


$V = \frac{Bh}{3}$

$= \frac{22 \cdot 5}{3}$

Examples

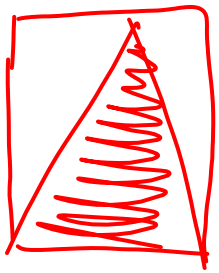
* Find the volume of the pyramid.



* $V = \frac{1}{3}Bh$
* $B = 22$; $h = 5$
* $V = \frac{1}{3}(22)(5) = 36.67$

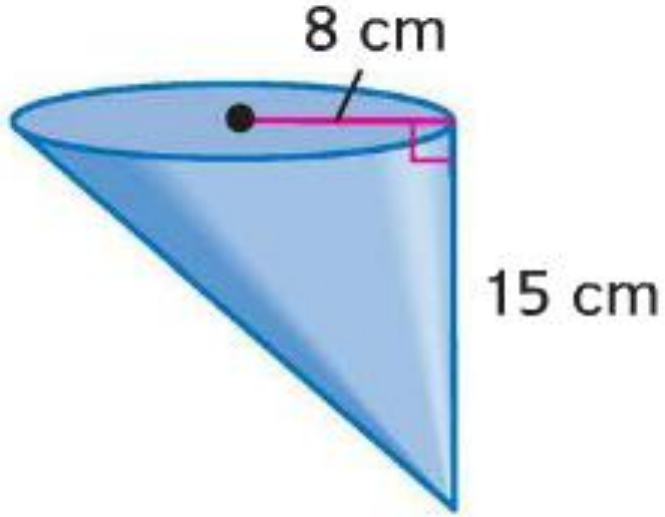
Volulme of a Cone

* The volume of a circular right cone is $V = \frac{1}{3}Bh$, or $V = \frac{1}{3}\pi r^2 h$, where B is the area of the base, h is the height of the cone, and r is the radius of the base.



Examples

* Find the volume of the cone. Round to the nearest tenth.

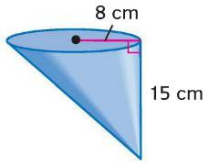


$$V = \frac{\pi r^2 h}{3}$$

$$= \frac{\pi 8^2 \cdot 15}{3}$$

Examples

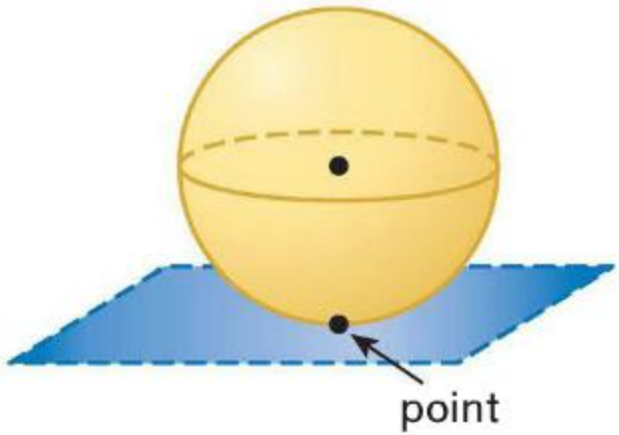
* Find the volume of the cone. Round to the nearest tenth.

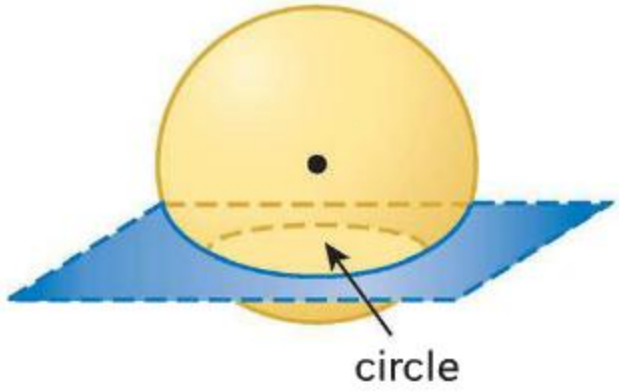


* $V = \frac{1}{3}\pi r^2 h$; $r = 8$, $h = 15$
* $V = \frac{1}{3}\pi(8^2)(15) = 320\pi = 1005.3$

Spheres

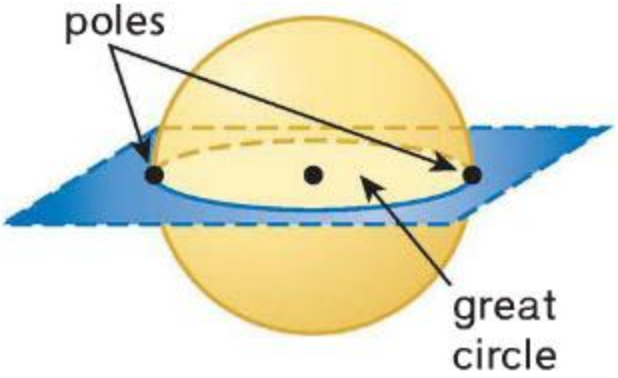
* A plane can intersect a sphere in a point or in a circle.





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.

Volume of a Sphere

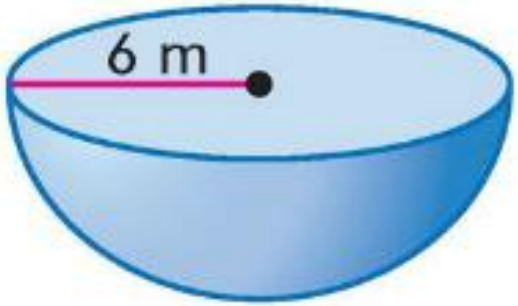
$S = 4\pi r^2$.

$\frac{}{3}$

* The volume V of a sphere is $V = \frac{4}{3}\pi r^3$, where *r* is the radius of the sphere.

Examples

* Find the volume of the sphere or hemisphere. Round to the nearest tenth.



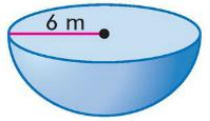
$$V = \frac{4\pi r^3}{3}$$

$$= \frac{4\pi 6^3}{3}$$

$$\approx$$

Examples

* Find the volume of the sphere or hemisphere. Round to the nearest tenth.



* $V = \frac{4}{3}\pi r^3$; $r = 6$
* $V = \frac{4}{3}\pi 6^3 = \frac{4}{3}\pi(216)$
* $V = 288\pi = 904.8$

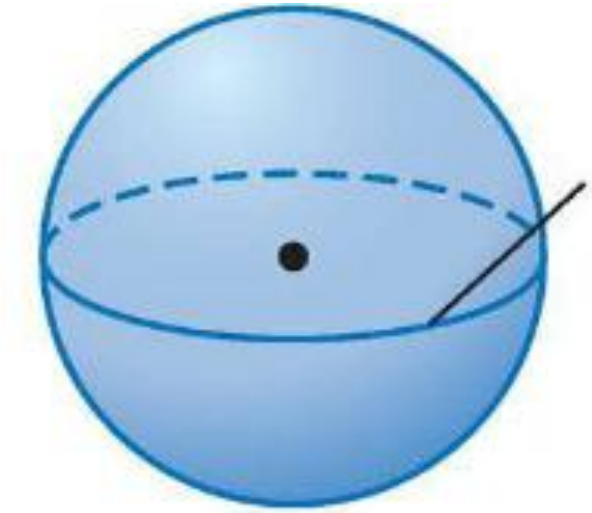
Examples

$C = 2\pi r$

$\frac{18\pi}{2\pi} = \frac{2\pi r}{2\pi}$

$9 = r$

* Find the volume of the sphere or hemisphere. Round to the nearest tenth.



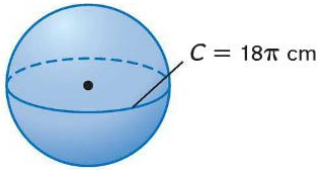
$C = 18\pi$ cm

$V = \frac{4\pi r^3}{3}$

$= \frac{4\pi(9)^3}{3}$

Examples

* Find the volume of the sphere or hemisphere. Round to the nearest tenth.



* $V = \frac{4}{3}\pi r^3$
* $C = 2\pi r$; $18\pi = 2\pi r \rightarrow r = 9$
* $V = \frac{4}{3}\pi 9^3 = \frac{4}{3}\pi(729) = 972\,\pi = 3053.6$