11.5 Volumes of prisms and cylinders

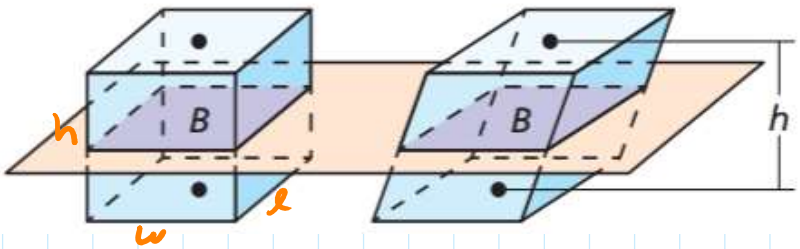
Monday, January 23, 2017 2:59 PM

What You Will Learn

- Find volumes of prisms and cylinders.
- ~~Use the formula for density.~~
- Use volumes of prisms and cylinders.

Finding Volumes of Prisms and Cylinders

The **volume** of a solid is the number of cubic units contained in its interior. Volume is measured in cubic units, such as cubic centimeters (cm^3). **Cavalieri's Principle**, named after Bonaventura Cavalieri (1598–1647), states that if two solids have the same height and the same cross-sectional area at every level, then they have the same volume. The prisms below have equal heights h and equal cross-sectional areas B at every level. By Cavalieri's Principle, the prisms have the same volume.



$V = \ell w h$

$B = \ell w$

Bases are $\cong$ & $\parallel$ then use $V = Bh$ where B = Area of a base

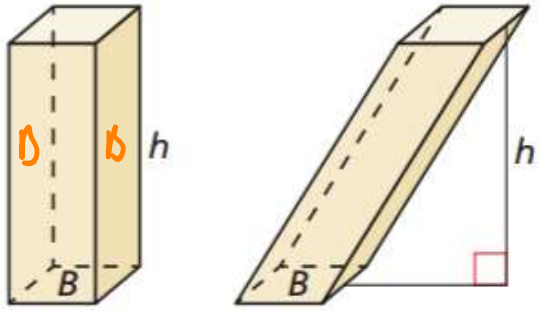
B: Area of a base

Volume of a Prism

The volume V of a prism is

$$V = Bh$$

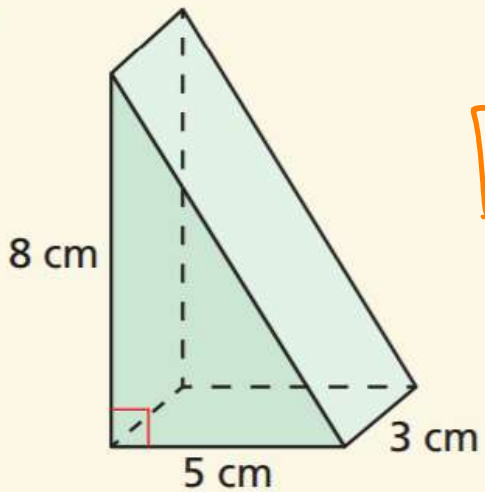
where B is the area of a base and h is the height.



h = distance between 2 Bases

Find the volume of each prism.

a.



$V = Bh$

$= 20\text{cm}^2(3\text{cm})$

$V = 60\text{cm}^3$

$B = \frac{1}{2}bh$

$= \frac{1}{2}(5\text{cm})(8\text{cm})$

$= \frac{1}{2}(40\text{cm}^2)$

$B = 20\text{cm}^2$

$x^2 = x \cdot x$

$x \cdot x^2$

$x \cdot x^2$

$x \cdot x \cdot x$

x^3

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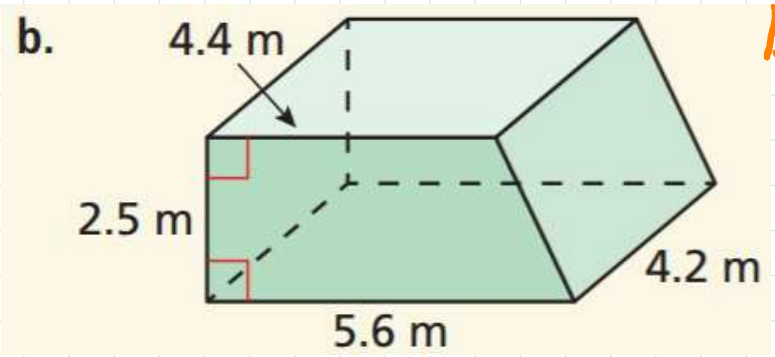
b.



$B = \frac{b_1 + b_2}{2}(h)$

$\frac{4.4\text{m} + 5.6\text{m}}{2}(2.5\text{m})$

$\frac{10\text{m}}{2}(2.5\text{m})$

$5\text{m}(2.5)\text{m}$

$B = 12.5\text{m}^2$

$V = Bh$

$(12.5\text{m}^2)(4.2\text{m})$

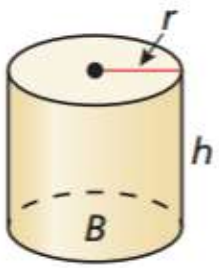
$V = 52.5\text{m}^3$

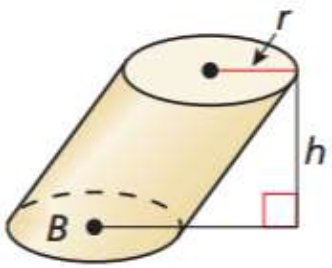
Volume of a Cylinder

The volume V of a cylinder is

$$V = Bh = \pi r^2 h$$

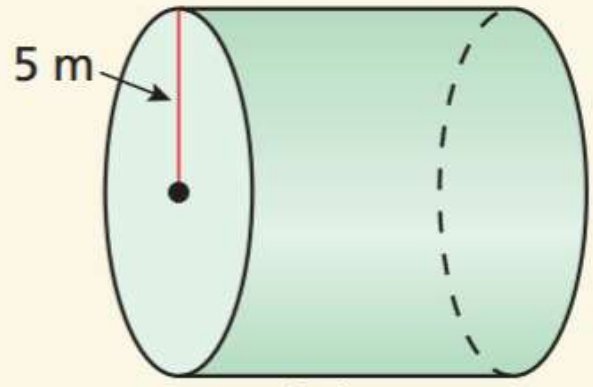
where B is the area of a base, h is the height, and r is the radius of a base.





Find the volume of each cylinder.

a.



$B = \pi r^2$

$\pi (5m)^2$

$\pi (25 m^2)$

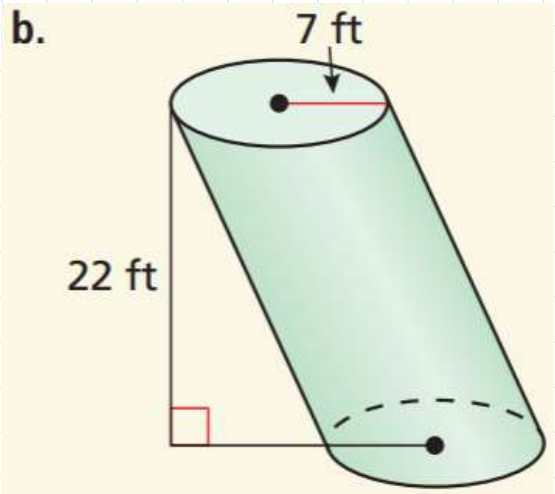
$B = 78.5 m^2$

$V = Bh$

$= (78.5 m)(9.1 m)$

$V = 714.7 m^3$

b.



$B = \pi r^2$

$\pi (7ft)^2$

$\pi (49 ft^2)$

$B = 153.9 ft^2$

$V = Bh$

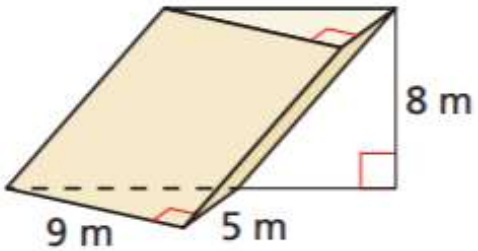
$(153.5\ ft^2)(22ft)$

$V = 3386.6\ ft^3$

$3385.8\ ft^3$

Find the volume of the solid.

1.



$V = Bh$

$(22.5\ m^2)(8m)$

$B = \frac{1}{2}bh$

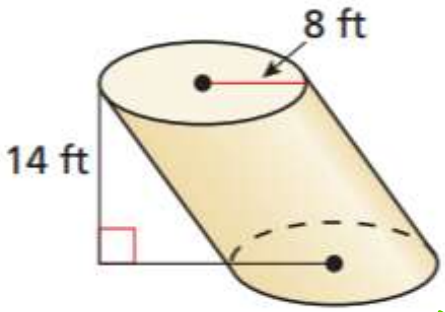
$\frac{1}{2}(5m)(9m)$

$\frac{1}{2}(45\ m^2)$

$B = 22.5\ m^2$

$V = 180\ m^3$

2.



$V = Bh$

$(201.1\ ft^2)14\ ft$

$V = 2814.9\ ft^3$

$V = 2815.4\ ft^3$

$B = \pi r^2$

$\pi(8ft)^2$

$\pi(64ft^2)$

$B = 201.1\ ft^2$

Practice sec 11.5 pg. 631: 3-12A, 17-21EO