Geometry 12.4
Find volumes of prisms*
Find volumes of cylinders**

*6th grade standard
**8th grade standard

volume (capacity)
cubic units
composite solid
oblique
Cavalieri's principle

$V = \ell \cdot w \cdot h$ (prisms)

* $V = B \cdot h$

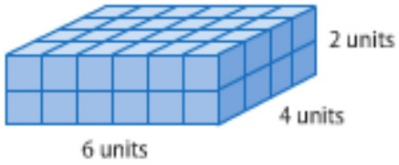
Quiz 12.1-12.2

thin slices are

1 Volume of Prisms

Recall that the volume of a solid is the measure of the amount of space the solid encloses. Volume is measured in cubic units.

The rectangular prism at the right has $6 \cdot 4$ or 24 cubic units in the bottom layer. Since there are two layers, the total volume is $24 \cdot 2$ or 48 cubic units.

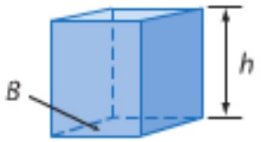


KeyConcept Volume of a Prism

Words 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.

Symbols $V = Bh$

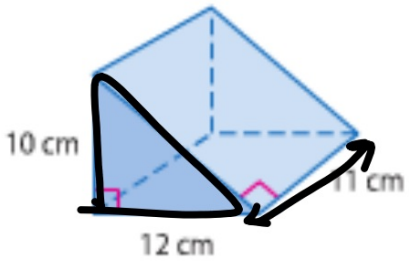
Model



Which part is the base?

Example 1 Volume of a Prism

Find the volume of the prism.



$V = B \cdot h$

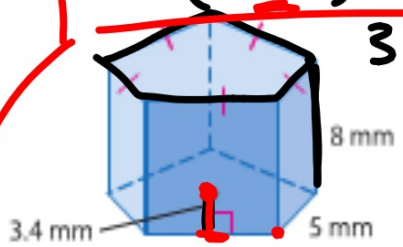
$= (60) \cdot 11$

$= 660 \text{ cm}^3$

$\frac{1}{2} \cdot 10 \cdot 12$

Guided Practice

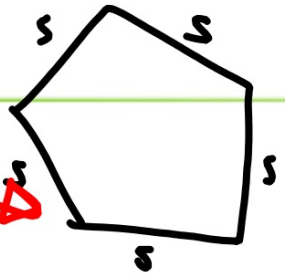
1A.



$V = Bh$

$= (42.5)\ 8\ mm^3$

$340\ mm^3$

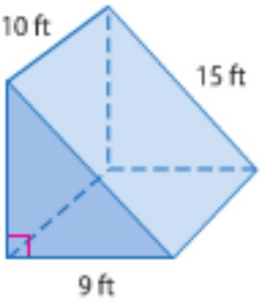


apothem

$\frac{1}{2} a p$

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

1B.

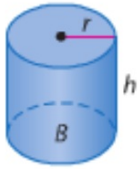


KeyConcept Volume of a Cylinder

Words 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 t[illegible] the base.

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

Model



* $V = Bh$

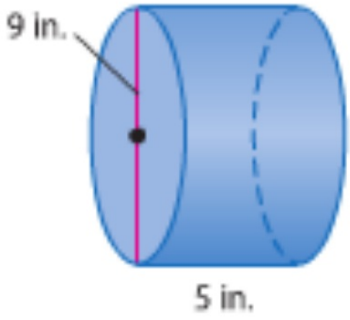
$= (\quad)h$

Example 2 Volume of a Cylinder

Find the volume of the cylinder at the right.

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

$= 318.1 \text{ in}^3$

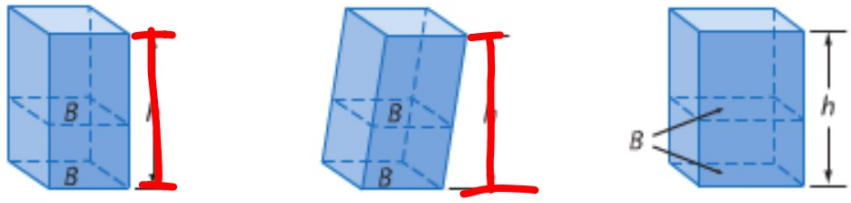


We can find volumes of oblique prisms/cylinders

KeyConcept Cavalieri's Principle

Words If two solids have the same height h and the same cross-sectional area B at every level, then they have the same volume.

Models



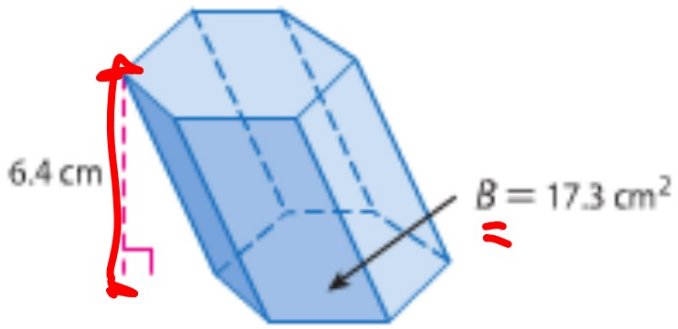
These prisms all have a volume of Bh.

Javier Larrea/age fotostock

Example 3 Volume of an Oblique Solid

Find the volume of an oblique hexagonal prism if the height is 6.4 centimeters and the base area is 17.3 square centimeters.

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



* $V = Bh$

$= (17.3)6.4$

$= 110.72 \text{ cm}^3$

4·7·x

4·10·x

Standardized Test Example 4 Comparing Volumes of Solids

PT

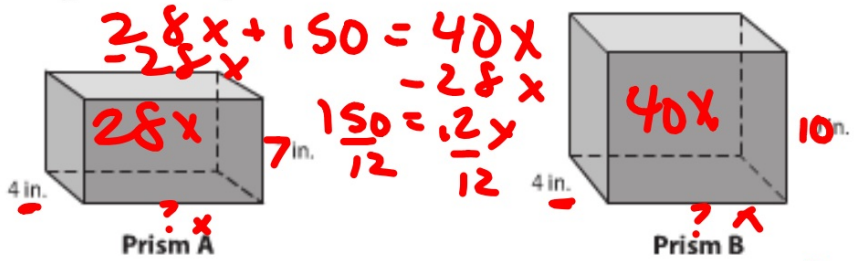
Prisms A and B have the same length and width, but different heights. If the volume of Prism B is 150 cubic inches greater than the volume of Prism A, what is the length of each prism?

$28x + 150 = 40x$

$-28x \quad -28x$

$\frac{150}{12} = \frac{12y}{12}$

+150



A 10 in.

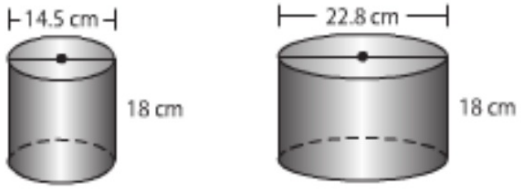
B $11\frac{1}{2}$ in.

C 12 in.

D $12\frac{1}{2}$ in.

GuidedPractice

4. The containers at the right are filled with popcorn. About how many times as much popcorn does the larger container hold?



F 1.6 times as much

G 2.5 times as much

H 3.3 times as much

J 5.0 times as much