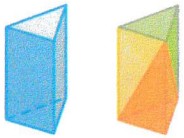
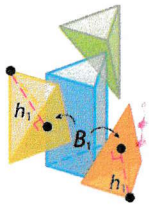
Volumes of Pyramids

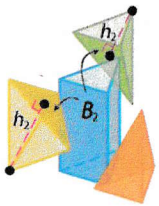
1 Volume of Pyramids A triangular prism can be separated into three triangular pyramids as shown. Since all faces of a triangular pyramid are triangles, any face can be considered a base of the pyramid.



The yellow and orange pyramids have base area B_1 and height h_1. Therefore, by Cavalieri's Principle, they have the same volume. Likewise, the yellow and green pyramids have base area B_2 and height h_2, so they have the same volume.



Since the orange and green pyramids have the same volume as the yellow pyramid, it follows that the volumes of all three pyramids are the same. Therefore, each pyramid has one third the volume of the prism with the same base area and height. This is true for a pyramid with any shape base.

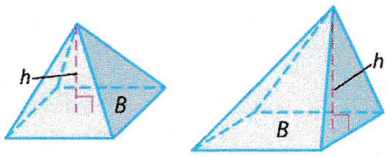


KeyConcept Volume of a Pyramid

Words 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.

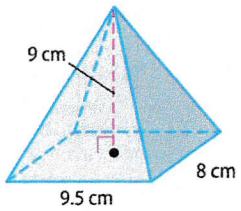
Symbols $V = \frac{1}{3}Bh$

Models



Example 1 Volume of a Pyramid

Find the volume of the pyramid.



$V = \frac{1}{3}Bh$ Volume of a pyramid

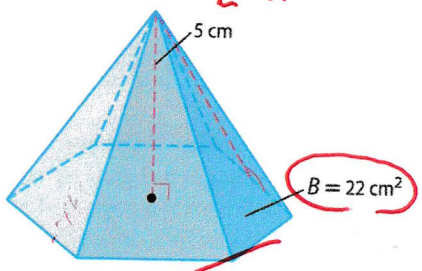
$= \frac{1}{3}(9.5 \cdot 8)(9)$ $B = 9.5 \cdot 8$ and $h = 9$

$= 228$ Simplify.

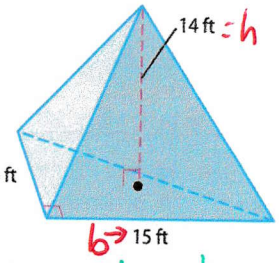
The volume of the pyramid is 228 cubic centimeters.

GuidedPractice

1A.



1B.



Base is a triangle

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

1A. $V = \frac{1}{3}Bh$

$\frac{1}{3} \cdot 22 \cdot 5$

$V = 36.67\text{cm}$ (3)

* make sure its cubed *

1B. $V = \frac{1}{3}Bh$

$\frac{1}{3} \cdot \frac{1}{2}bh \cdot h$

$\frac{1}{3} \cdot \frac{1}{2} \cdot 15 \cdot 6 \cdot 14$

$V = 210\text{ft}$ (3)