

Volume of a Square Based Pyramid

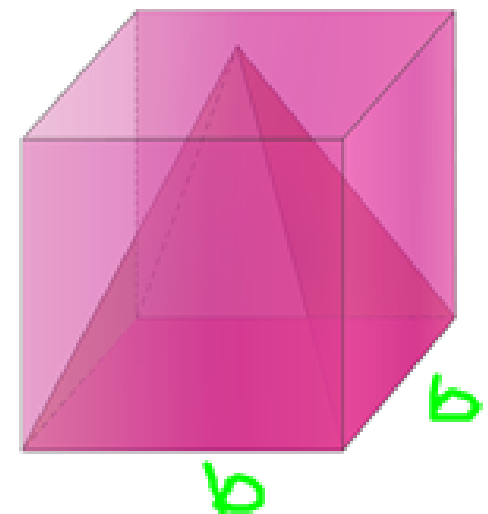
Compare a square based pyramid and a cube with the same base...which has a larger volume? Show using a diagram.

How much bigger does it seem?

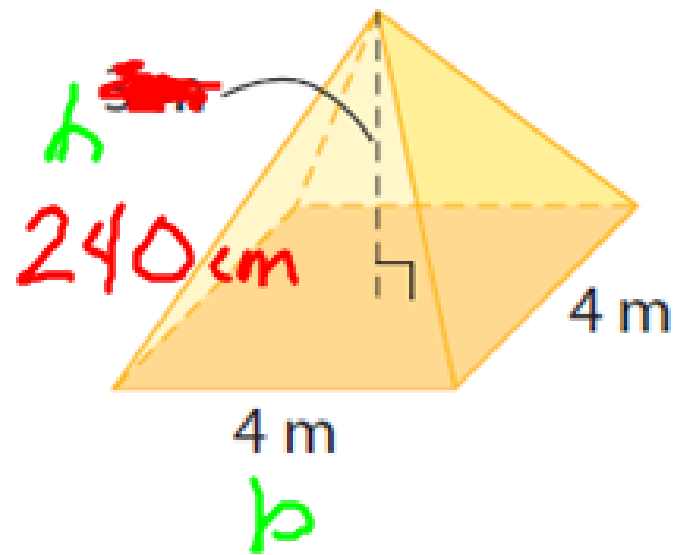
A cube is actually 3 times larger than a square based pyramid.
This means that to find the volume of a pyramid, we can use the formula of a rectangular prism, and then divide by 3.

ie...

$$V_{\text{sq pyr}} = \frac{b^2 \cdot h}{3}$$



Example 1. Find the volume of the following shape.



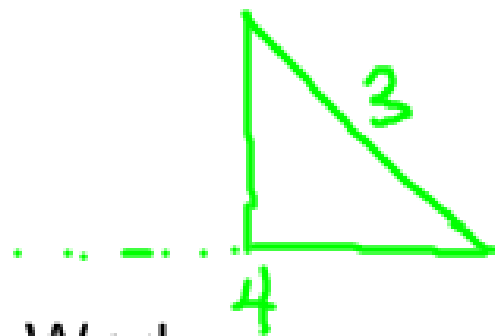
$$V_{\text{sq pyr}} = \frac{b^2 h}{3}$$

$$V = \frac{(4^2)(3)}{3}$$

$$V = \frac{48}{3}$$

$$a^2 + b^2 = c^2$$

$$V = 16 \text{ m}^3$$



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11. The Muttart Conservatory in Edmonton, Alberta, is made up of four square-based pyramids. The two large pyramids are 24 m high and have a base length of 26 m. The two small pyramids are 18 m high and have a base length of 19.5 m. What is the total volume of all four pyramids?

$$V_L = \frac{b^2 h}{3} \quad \begin{array}{l} b = 26 \text{ m} \\ h = 24 \text{ m} \end{array}$$

$$V_L = \frac{(26)^2 (24)}{3}$$

$$V_L = \frac{16224}{3}$$

$$V_L = 5408 \text{ m}^3$$

$$V_S = \frac{b^2 h}{3} \quad \begin{array}{l} b = 19.5 \text{ m} \\ h = 18 \end{array}$$

$$V_S = \frac{(19.5)^2 (18)}{3}$$

$$V_S = \frac{6844.5}{3}$$

$$V_S = 2281.5 \text{ m}^3$$

$$V_{\text{tot}} = 2(5408 \text{ m}^3) + 2(2281.5 \text{ m}^3)$$

$$V_{\text{tot}} = 15379 \text{ m}^3$$

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Volume of a Composite Figure



$$V_{\text{TOT}} = V_R + V_T$$

$$V_R = lwh$$

$$V_T = \frac{bhl}{2}$$

The amount of venting required for a garage depends on its size.

The shape of the garage shown is a **composite figure**. Calculate the volume of the garage.

$$h = 13 - 9 \\ = 4$$

$$V_R = (15)(12)(9) \\ = 1620 \text{ ft}^3$$

$$V_T = \frac{(12)(4)(15)}{2}$$

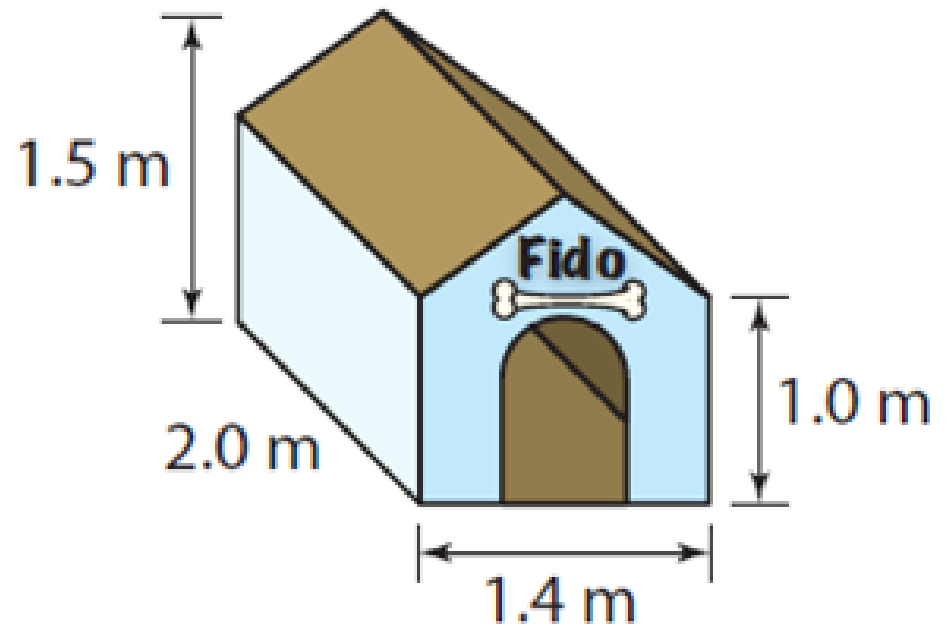
$$V_T = \frac{720}{2}$$

$$V_{\text{TOT}} = 1620 \text{ ft}^3 + 360 \text{ ft}^3 \\ V_{\text{TOT}} = 1980 \text{ ft}^3$$

$$V_T = 360 \text{ ft}^3$$

Your Turn

Determine the volume of Fido's doghouse.



$$V_R = lwh$$

$$V_T = \frac{b \cdot h \cdot l}{2}$$

$$\begin{aligned} V_R &= (2.0\text{m})(1.4\text{m})(1.0\text{m}) \\ &= 2.8\text{m}^3 \end{aligned}$$

$$\begin{aligned} V_T &= \frac{(1.4)(0.5)(2.0)}{2} \\ V_T &= 0.7\text{m}^3 \end{aligned}$$

$$\begin{aligned} V_{\text{Total}} &= 2.8\text{m}^3 + 0.7\text{m}^3 \\ &= 3.5\text{m}^3 \end{aligned}$$

Homework:

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