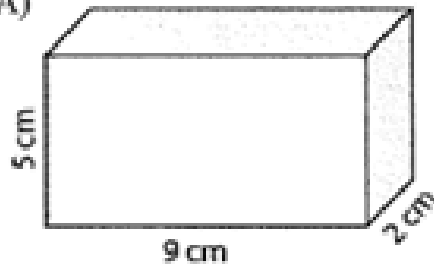


Get out your homework and have it ready to check.

Classwork - Volume of Pyramids

1) Find the volume of the following of 3D figures. SHOW AND LABEL

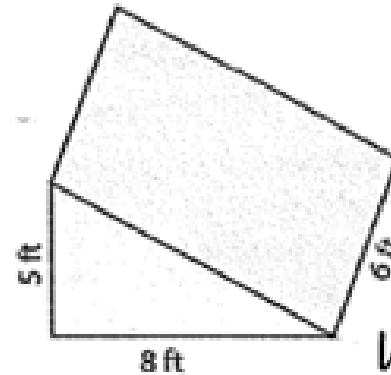
A)



$$V = 5 \cdot 9 \cdot 2$$

$$\text{Volume} = \underline{90 \text{ cm}^3}$$

B)

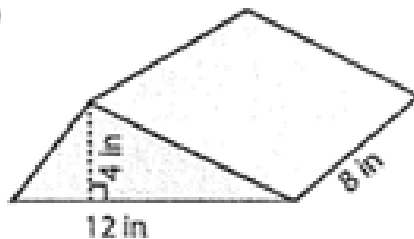


$$B = \frac{1}{2}(5)(8) = 20 \text{ ft}^2$$

$$V = 20(6)$$

$$\text{Volume} = \underline{120 \text{ ft}^3}$$

C)

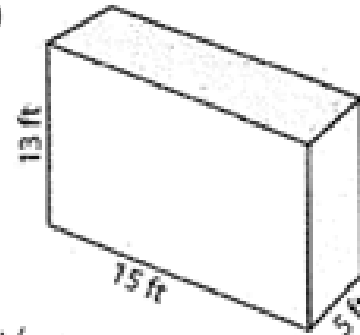


$$B = \frac{1}{2}(4)(12) = 24 \text{ in}^2$$

$$V = 24(8)$$

$$\text{Volume} = \underline{192 \text{ in}^3}$$

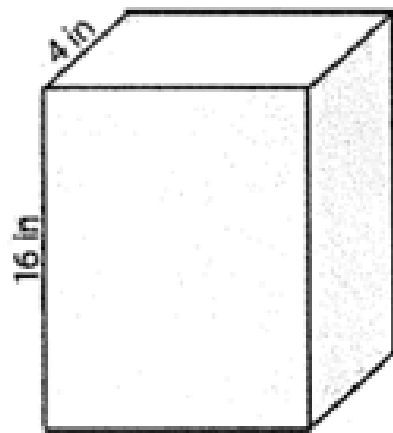
D)



$$V = 13 \cdot 15 \cdot 5$$

$$\text{Volume} = \underline{975 \text{ ft}^3}$$

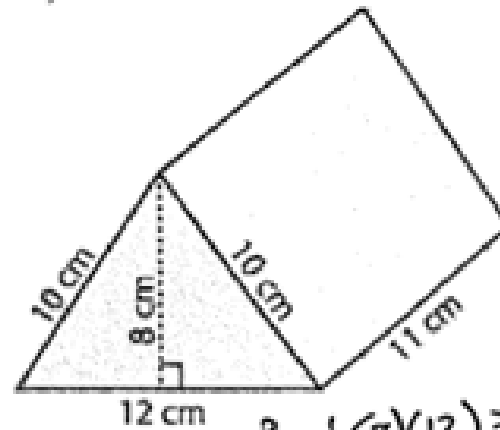
E)



$$V = 4 \cdot 16 \cdot 9$$

$$\text{Volume} = \underline{576 \text{ in}^3}$$

F)



$$B = \frac{1}{2}(8)(12) = 48$$

$$V = 48(11)$$

$$\text{Volume} = \underline{528 \text{ cm}^3}$$

2) A) You found a treasure chest full of pearls. Use the figure below to find the volume of the treasure chest.

$$V = 120(60)(60) = 432000 \text{ cm}^3$$

B) Each pearl approximately occupies 2 cubic centimeters of space. Approximately how many pearls fit in the treasure chest?

$$432000 \div 2 = \underline{216000 \text{ pearls}}$$



3) Jefferson Middle School has two types of lockers that are shown to the right. Which locker, school or gym, has more storage space? SHOW WORK AND LABEL.

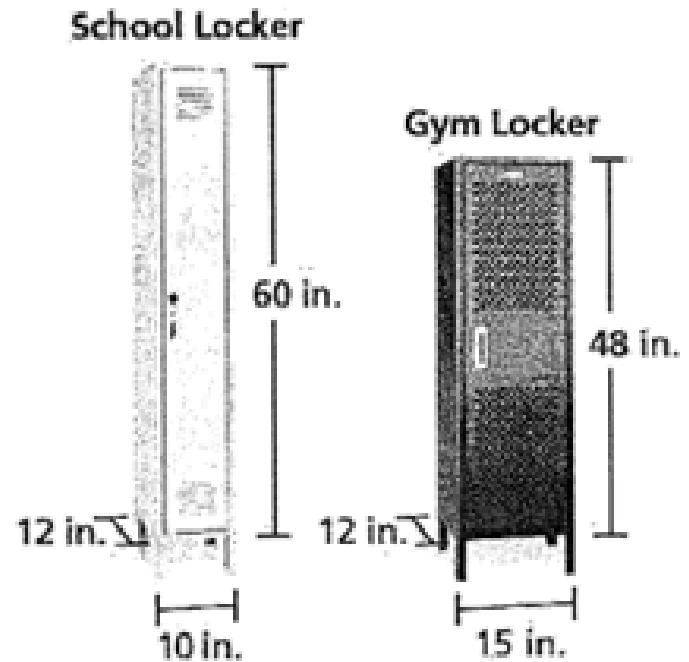
$$V = 12(10)(16)$$

$$V = 7200 \text{ in}^3$$

$$V = 12(15)(48)$$

$$V = 8640 \text{ in}^3$$

Locker with more space → Gym Locker



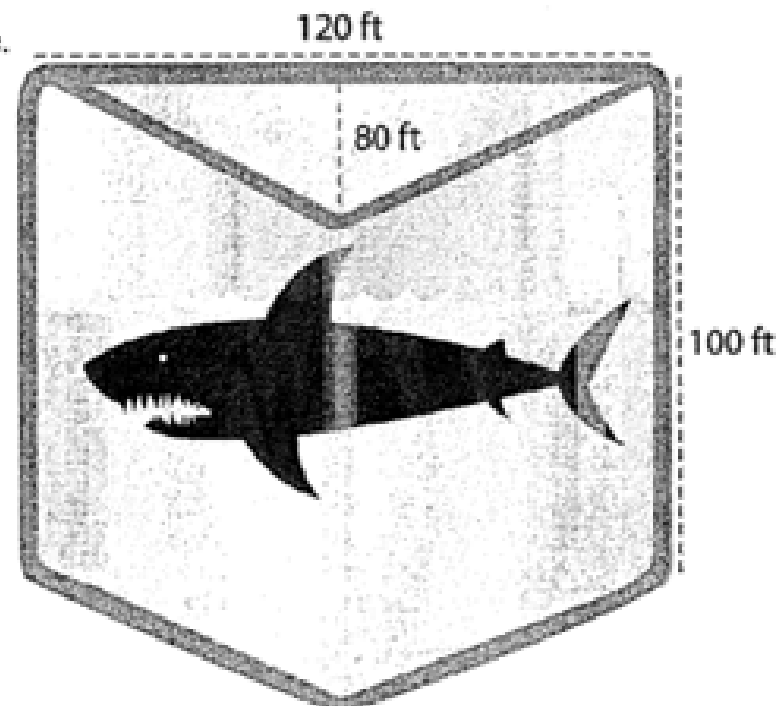
4) The Zoo has a triangular prism shape shark tank, shown to the right. They want to fill the tank to its maximum volume. How many cubic feet of water will fit into the shark tank?

SHOW WORK AND LABEL.

$$B = \frac{1}{2}(80)(120) = 4800 \text{ ft}^2$$

$$V = 4800(100)$$

Volume = 480000 ft³

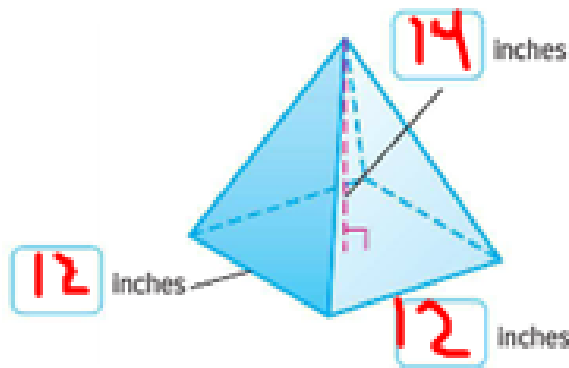




Real-World Link

Sand Sculpture Dion is helping his mother build a sand sculpture at the beach in the shape of a pyramid. The square pyramid has a base with a length and width of 12 inches each and a height of 14 inches.

1. Label the dimensions of the sand sculpture on the square pyramid below.



2. What is the area of the base of the pyramid?

$$B = 12 \cdot 12 = 144 \text{ in}^2$$

3. What is the volume of a square prism with the same dimensions as the pyramid?

$$V = 144 \cdot 14 = 2016 \text{ in}^3$$

P. 653

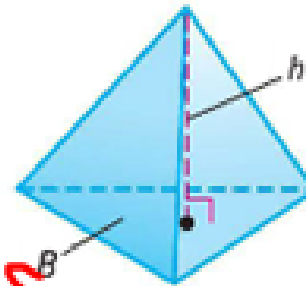
$$V = \frac{1}{3} B h$$

$$V = \frac{1}{3} \cdot 2016 = 672 \text{ in}^3$$

Volume of a Pyramid

Words The volume V of a pyramid is one third the area of the base B times the height of the pyramid h .

Model



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

$B \rightarrow$ Area of the Base

In a polyhedron, any face that is not a base is called a **lateral face**. The lateral faces of a pyramid meet at a common vertex. The height of a pyramid is the distance from the vertex perpendicular to the base.

Examples

1. Find the volume of the pyramid. Round to the nearest tenth.

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

Volume of a pyramid

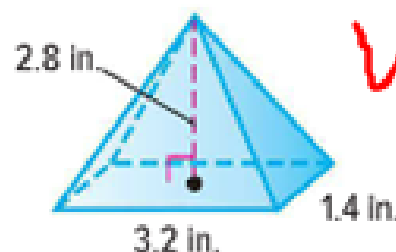
$$V = \frac{1}{3}(3.2 \cdot 1.4)2.8$$

$$B = 3.2 \cdot 1.4, h = 2.8$$

$$V \approx 4.2$$

Simplify.

The volume is about 4.2 cubic inches.



$$B = 3.2 \cdot 1.4 = 4.48$$

$$V = \frac{1}{3}(4.48)(2.8)$$

$$V = 4.2 \text{ in}^3$$

2. Find the volume of the pyramid. Round to the nearest tenth.

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

Volume of a pyramid

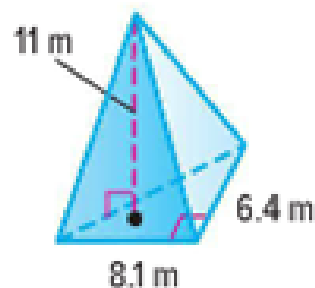
$$V = \frac{1}{3}\left(\frac{1}{2} \cdot 8.1 \cdot 6.4\right)11$$

$$B = \frac{1}{2} \cdot 8.1 \cdot 6.4, h = 11$$

$$V = 95.04$$

Simplify.

The volume is about 95.0 cubic meters.



$$B = \frac{1}{2} \cdot 8.1 \cdot 6.4$$

$$B = 25.92$$

$$V = \frac{1}{3}(25.92)(11)$$

$$V = 95.04 \text{ m}^3$$

Got it? Do this problem to find out.

$$V = \frac{1}{3} B h$$

- a. Find the volume of a pyramid that has a height of 9 centimeters and a rectangular base with a length of 7 centimeters and a width of 3 centimeters.

$$B = 7 \cdot 3 = 21 \text{ cm}^2$$

$$V = \frac{1}{3} (21)(9) = 63 \text{ cm}^3$$

Find the Height of a Pyramid

You can also use the formula for the volume of a pyramid to find a missing height.

Examples

Tutor

3. The rectangular pyramid shown has a volume of 90 cubic inches. Find the height of the pyramid.

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

Volume of a pyramid

$$90 = \frac{1}{3}(9 \cdot 5)h$$

$$V = 90, B = 9 \cdot 5$$

$$90 = 15h$$

Multiply.

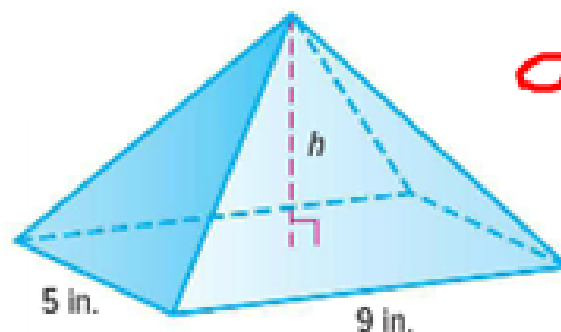
$$\frac{90}{15} = \frac{15h}{15}$$

Divide by 15.

$$6 = h$$

Simplify.

The height of the pyramid is 6 inches.



$$B = 5 \cdot 9 = 45 \text{ in}^2$$

$$90 = \frac{1}{3}(45) \cdot h$$

$$\frac{90}{15} = \frac{15h}{15}$$

$$6 = h$$

4. A triangular pyramid has a volume of 44 cubic meters. It has an 8-meter base and a 3-meter height. Find the height of the pyramid.

$$B = \frac{1}{2} \cdot 3 \cdot 8 = 12 \text{ m}^2$$

$$V = \frac{1}{3} B h$$

Volume of a pyramid

$$44 = \frac{1}{3} \left(\frac{1}{2} \cdot 8 \cdot 3 \right) h$$

$$V = 44, B = \frac{1}{2} \cdot 8 \cdot 3$$

$$44 = 4h$$

Multiply.

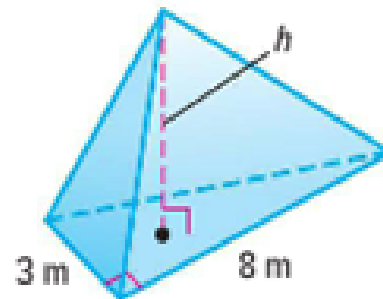
$$\frac{44}{4} = \frac{4h}{4}$$

Divide by 4.

$$11 = h$$

Simplify.

The height of the pyramid is 11 meters.



Got it? Do these problems to find out.

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

b. A triangular pyramid has a volume of 840 cubic inches. The triangular base has a base length of 20 inches and a height of 21 inches. Find the height of the pyramid.

b) c. A rectangular pyramid has a volume of 525 cubic feet. It has a base of 25 feet by 18 feet. Find the height of the pyramid.

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

$$B = \frac{1}{2} \cdot 20 \cdot 21 = 210 \text{ in}^2$$

$$840 = \frac{1}{3} \cdot 210 \cdot h$$

$$\frac{840}{70} = \frac{70 \cdot h}{70} \quad h = 12 \text{ in}$$

$$c) B = lw$$

$$B = 25 \cdot 18 = 450 \text{ ft}^2$$

$$525 = \frac{1}{3} \cdot 450 \cdot h$$

$$\frac{525}{150} = \frac{150h}{150}$$

$$h = 3.5 \text{ ft}$$



Example

Tutor

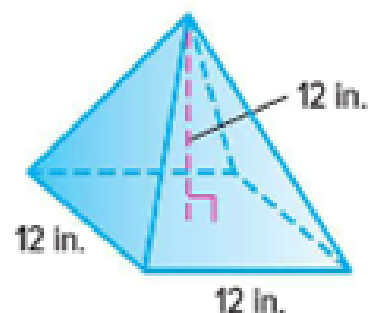
- 5.** Kamilah is making a model of the Food Guide Pyramid for a class project.
Find the volume of the square pyramid.

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

$$V = \frac{1}{3}(12 \cdot 12)12 \quad B = 12 \cdot 12, h = 12$$

$$V = 576 \quad \text{Multiply.}$$

The volume is 576 cubic inches.

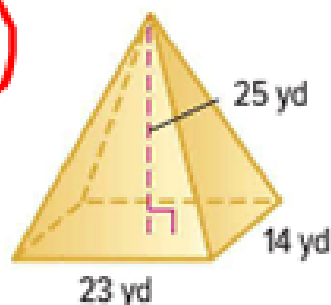


Guided Practice

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

Find the volume of each pyramid. Round to the nearest tenth if necessary. (Examples 1 and 2)

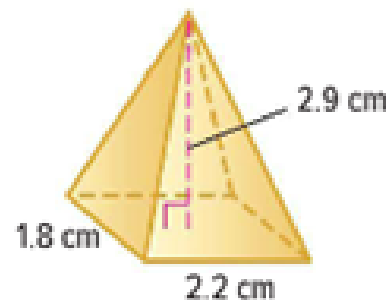
1.



$$B = 23 \cdot 14 = 322 \text{ yd}^2$$
$$V = \frac{1}{3} \cdot 322 \cdot 25$$

$$V = 2683.\bar{3} \text{ yd}^3$$

2.



Find the height of each pyramid. (Examples 3 and 4)

3. square pyramid: volume $1,024 \text{ cm}^3$;

base edge 16 cm _____

4. triangular pyramid: volume 48 in^3 ; base

edge 9 in.; base height 4 in. _____