

Warm Up:

1 **Algebra** The volume of a cylinder is $600\pi \text{ cm}^3$. The radius of a base of the cylinder is 5 cm. What is the height of the cylinder?

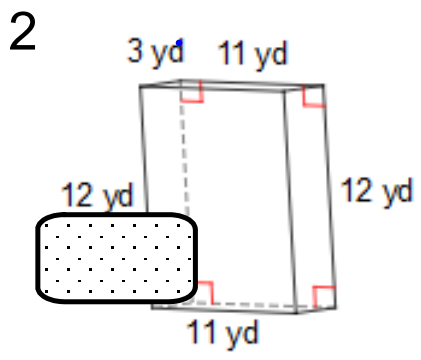
$$V = \pi r^2 h$$

$$600\pi = \pi(5)^2 h$$

$$\frac{600\pi}{25\pi} = \frac{25\pi h}{25\pi}$$

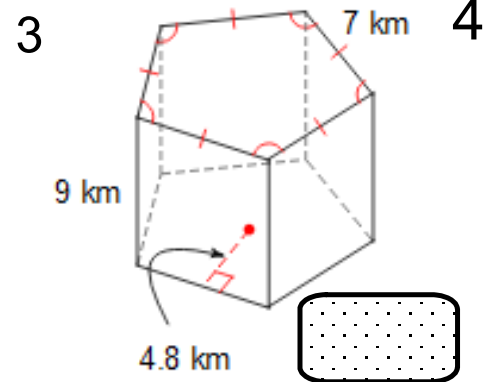
$$h = 24 \text{ cm}$$

$$V = \pi(4)^2(8)$$



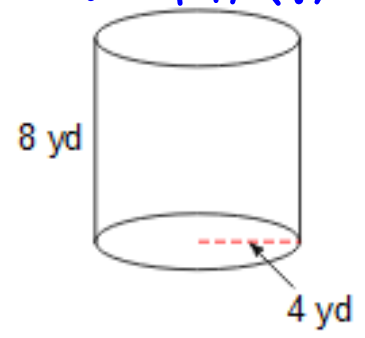
$$V = 11(3)(12)$$

$$396 \text{ yd}^3$$

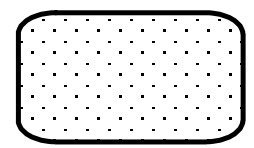


$$\frac{1}{2}(4.8)(7)(5)(9)$$

$$756 \text{ km}^3$$



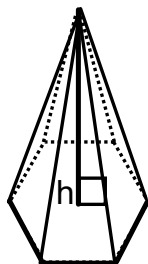
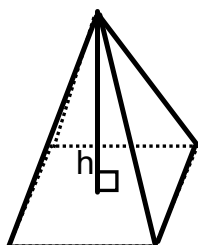
$$402.12 \text{ yd}^3$$



Learning Goal: Today I will learn how to find the volume of a pyramid.

Success Criteria: I am able to find the area of the base in order to calculate volume.

11-5 Volume of Pyramids

17 Volume of a Pyramid

- one base of any shape polygon
- triangular sides that meet in common vertex

B = area of base

h = height (inside) of pyramid

Volume

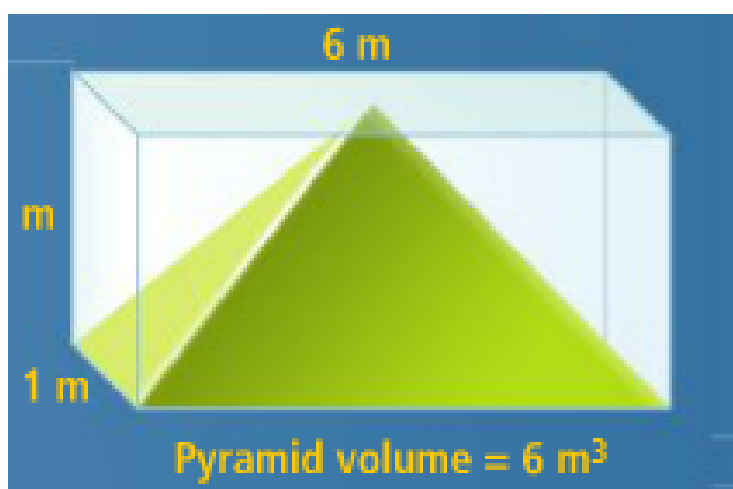
$$V = \frac{1}{3}Bh$$

Example:

A square-base pyramid has side lengths of 4 inches and a height of 5 inches. What is the volume?

$$B = 4 \cdot 4 = 16$$
$$V = \frac{1}{3}(16)(5) = 26.7$$

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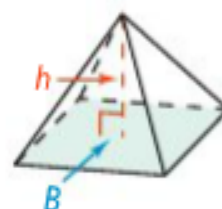
Does a pyramid take up the entire prism?

Take note

Theorem 11-8 Volume of a Pyramid

The volume of a pyramid is one third the product of the area of the base and the height of the pyramid.

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



Problem 2 Finding the Volume of a Pyramid **GRIDDED RESPONSE**

What is the volume in cubic feet of a square pyramid with base edges 40 ft and slant height 25 ft?

Step 1 Find the height of the pyramid.

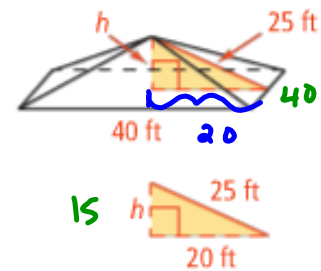
$$c^2 = a^2 + b^2 \quad \text{Use the Pythagorean Theorem.}$$

$$25^2 = h^2 + 20^2 \quad \text{Substitute 25 for } c, h \text{ for } a, \text{ and } \frac{40}{2}, \text{ or } 20, \text{ for } b.$$

$$625 = h^2 + 400 \quad \text{Simplify.}$$

$$h^2 = 225 \quad \text{Solve for } h^2.$$

$$h = 15 \quad \text{Take the positive square root of both sides.}$$

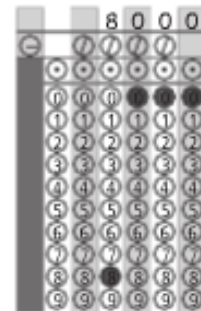


Step 2 Find the volume of the pyramid.

$$V = \frac{1}{3}Bh \quad \text{Use the formula for volume of a pyramid.}$$

$$= \frac{1}{3}(40 \cdot 40)(15) \quad \text{Substitute } 40 \cdot 40 \text{ for } B \text{ and } 15 \text{ for } h.$$

$$= 8000 \quad \text{Simplify.}$$



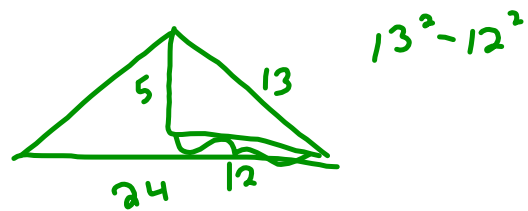
The volume of the pyramid is 8000 ft³.

Got It? 2. What is the volume of a square pyramid with base edges 24 m and slant height 13 m?

$$B = 24(24)$$

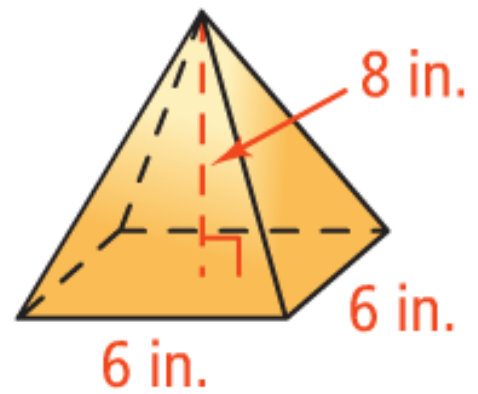
$$V = \frac{1}{3}(576)(5)$$

$$V = 960 \text{ m}^3$$



Find the volume.

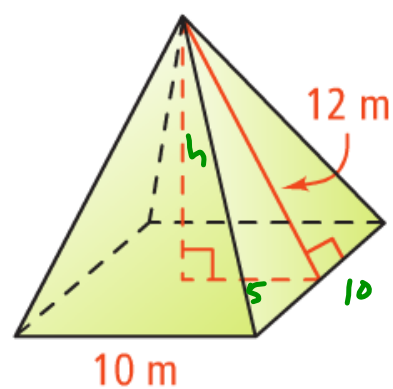
$$V = \frac{1}{3} (6)(6)(8) = 96 \text{ in}^3$$



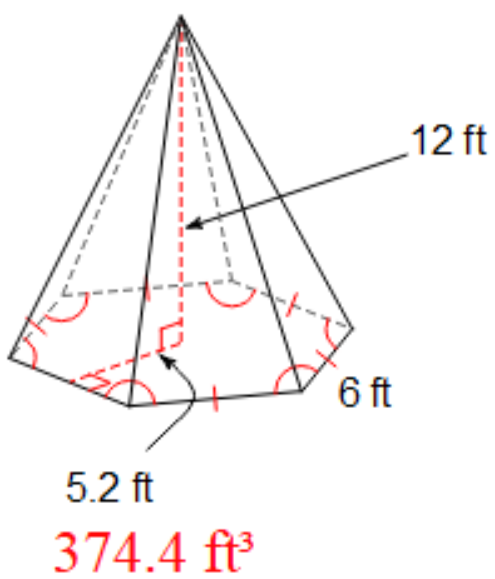
Find the volume.

$$V = \frac{1}{3}(10)(10)(10.9)$$

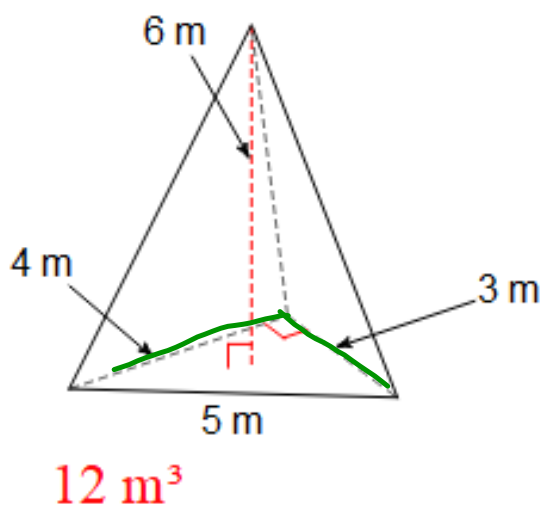
$$V = 363.3 \text{ m}^3$$



$$12^2 - 5^2 = 10.9$$

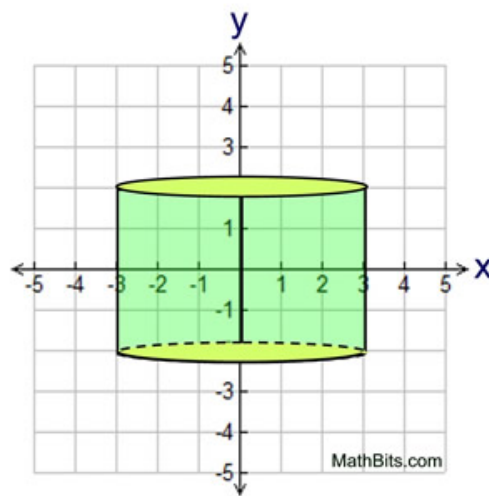
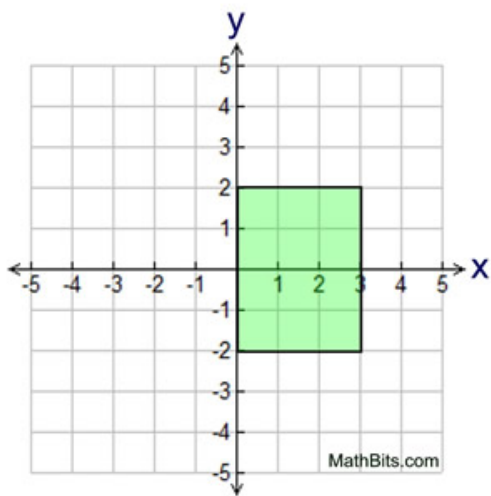


$$B = \frac{1}{2} a s n$$
$$B = \frac{1}{2} (5.2) (6) (6)$$
$$B = 93.6$$
$$V = \frac{1}{3} (93.6) (12)$$



$$B = \frac{1}{2} b \cdot h$$
$$B = \frac{1}{2} (4)(3)$$
$$B = 6$$

$$V = \frac{1}{3} (6)(6)$$



door filled the entire space as it revolved, a cylindrical solid would be formed.

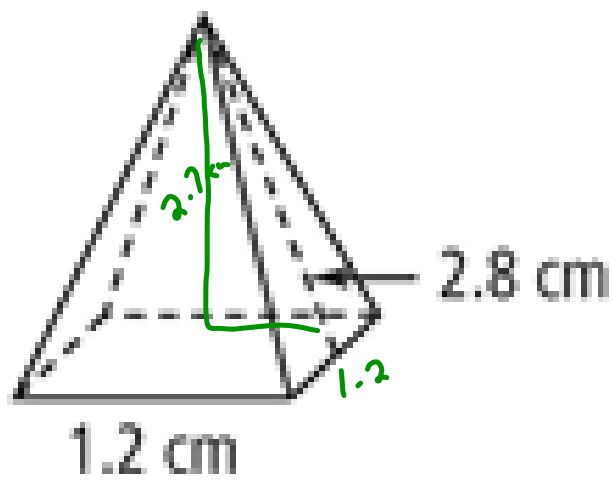


With the idea of revolution (rotation) in mind,

Let's consider the volume of a cylinder. The volume of a cylinder is given by the formula $V = \pi r^2 h$, where r is the radius and h is the height.

Find the volume

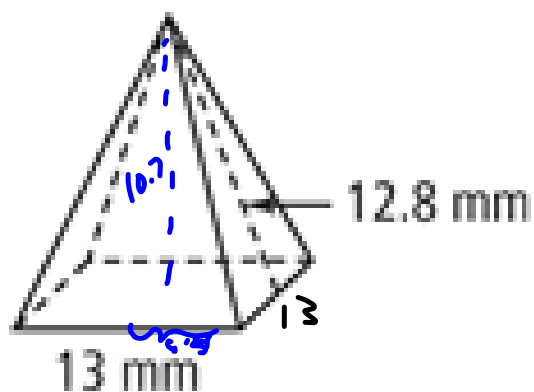
$$2.9^2 - 0.6^2$$



$$V = \frac{1}{3}(1.2)(1.2)(2.7)$$

$$V = 1.3 \text{ cm}^3$$

Find the volume



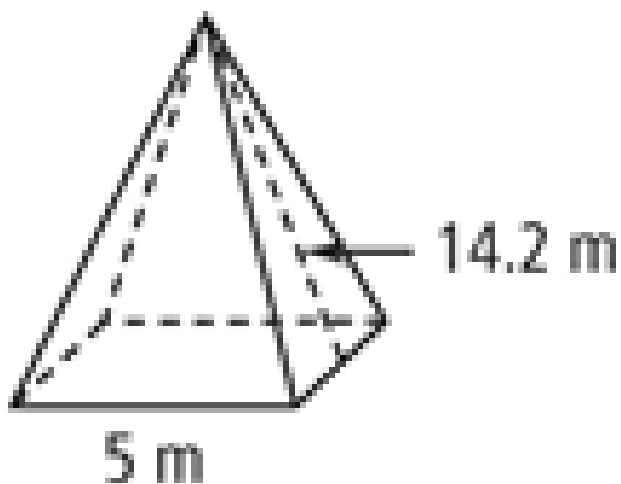
$$\frac{12.8^2 \cdot 1.2}{11}$$

$$V = \frac{1}{3}(13)(13)(11)$$

$$619.7 \text{ mm}^3$$

Whiteboard Practice

Find the volume



$$14.2^2 - 2.5^2$$

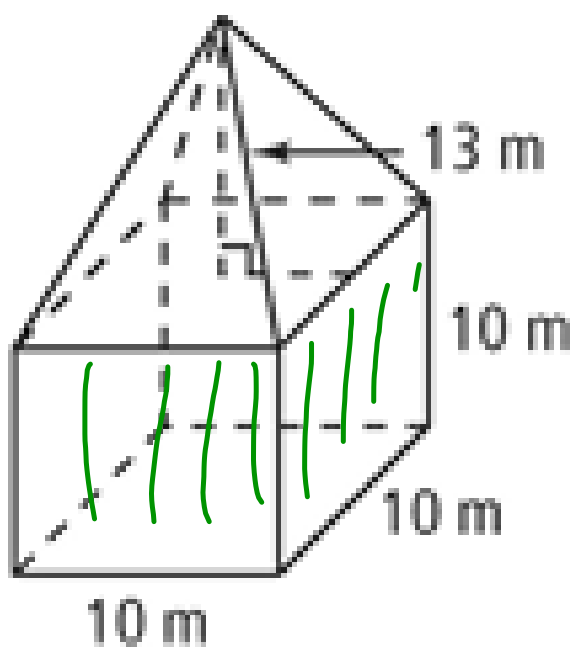
$$h = 14$$

$$V = \frac{1}{3}(5)(5)(14)$$

$$116.7 \text{ m}^3$$

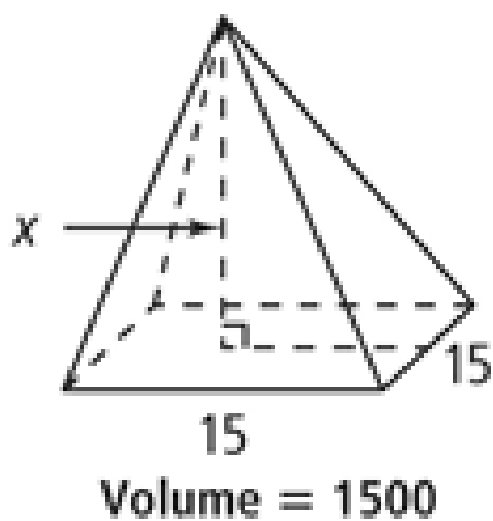
The base of a pyramid is a square, 4.5 cm on a side. The height is 5 cm. Find the volume.

$$V = \frac{1}{3}(4.5 \times 4.5)(5)$$
$$V = 33.8 \text{ cm}^3$$



$$V = 10(10)(10)$$
$$V = 1000 \text{ m}^3$$

$$V = \frac{1}{3}(10 \times 10)(13)$$
$$433.3 \text{ m}^3$$
$$1433.3 \text{ m}^3$$



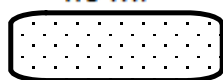
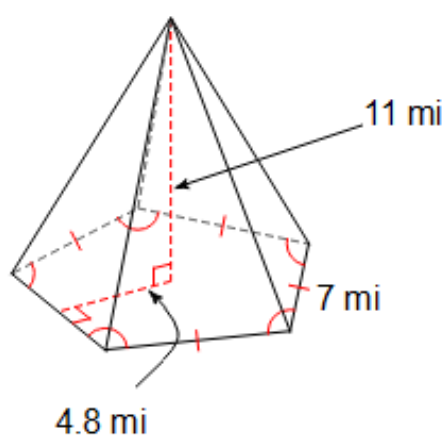
$$V = \frac{1}{3}(15)(15)x$$

$$1500 = \frac{1}{3}(225)x$$

$$\frac{1500}{75} = \frac{75x}{75}$$

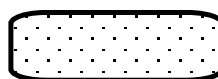
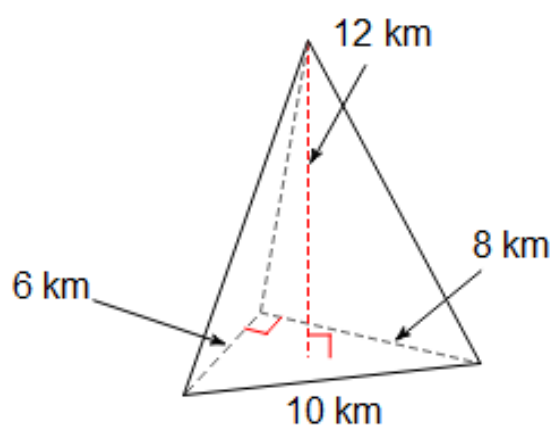
$$x = 20$$

1)



$$\frac{1}{3} \left(\frac{1}{2} (4.8 \times 7) \right) (11)$$

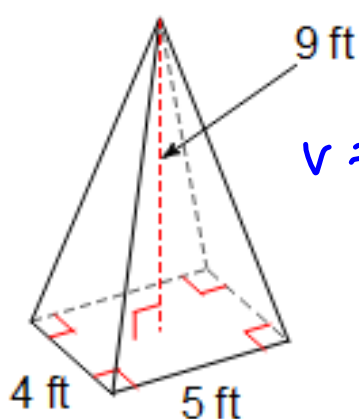
2)



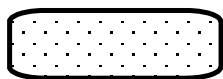
$$A = \frac{1}{2} (6) (10)$$

$$\frac{1}{3} \left(\frac{1}{2} (6) (10) \right) (12)$$

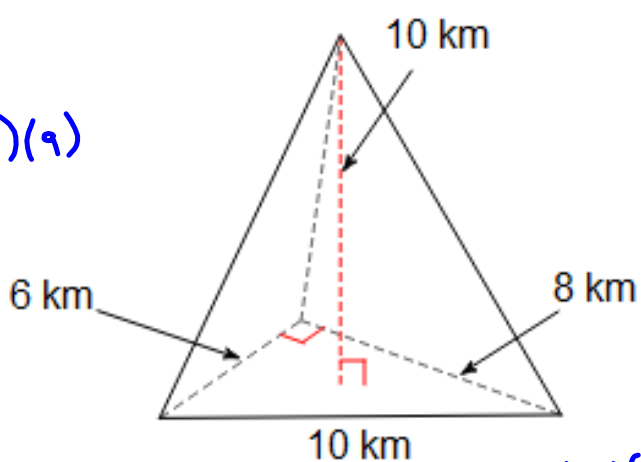
3)



$$V = \frac{1}{3}(4)(5)(9)$$

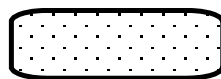


4)

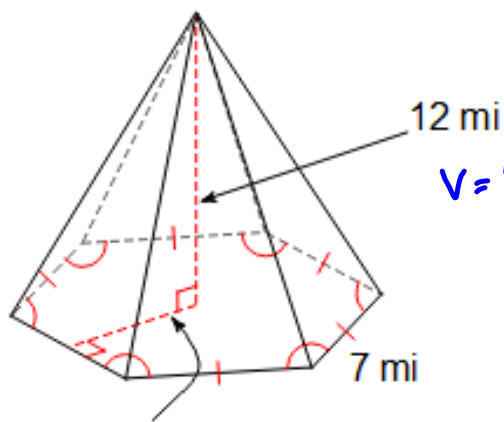


10 km

$$V = \frac{1}{3}\left(\frac{1}{2}(6)(8)\right)(10)$$



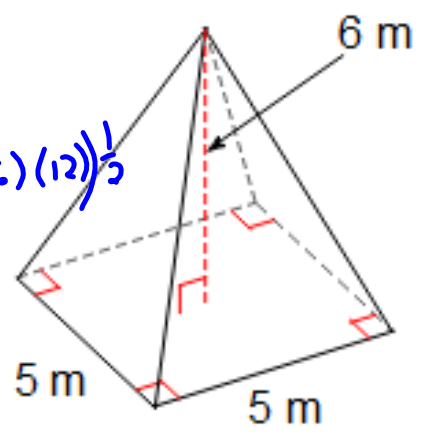
5)



6.1 mi
512.4 mi³

$$V = \frac{1}{3}((6.1)(7)(6)(12)) \frac{1}{2}$$

6)



50 m³

Closure: Today I learned how to use the base area and height to calculate volume.

