Similar Solids: Two solids of the same type with equal ratios of corresponding linear measures, such as height or radii, are called similar solids. (k)

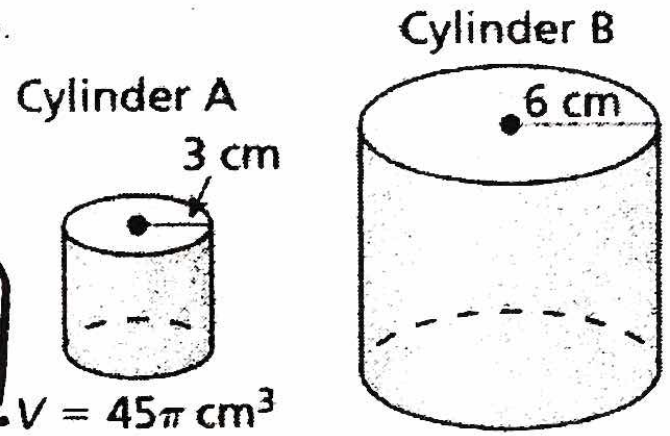
→ The ratio of the corresponding linear measures of two similar solids is called the scale factor

→ If two similar solids have a scale factor of k, then the ratio of their volumes is equal to k^3.

vol. ratio = (s.f.)^3

Example:

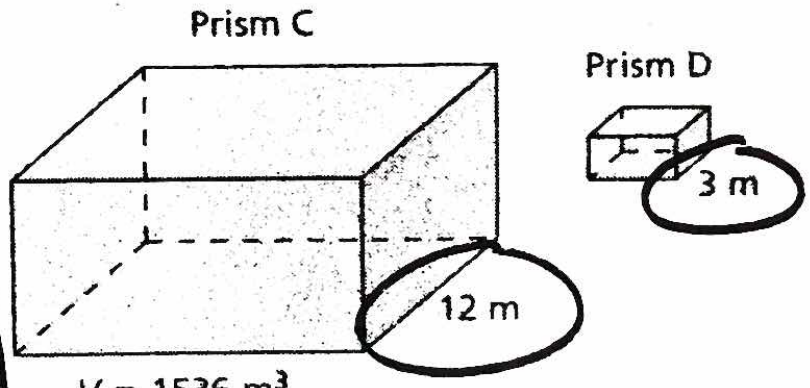
4. Cylinder A and cylinder B are similar. Find the volume of cylinder B.



$$\frac{45\pi}{B} = \left(\frac{13}{26}\right)^3$$

$$\frac{45\pi}{B} = \frac{1}{8} \rightarrow \boxed{B = 360\pi}$$

5. Prism C and prism D are similar. Find the volume of prism D.



$$\frac{1536}{D} = \left(\frac{4}{3}\right)^3$$

$$\frac{1536}{D} = \frac{64}{1} \rightarrow \boxed{D = 24\ m^3}$$

6. Find the volume of the figure.

Name: Date: Period:

Volume of Pyramids and Cones

Lesson Objective WBAT derive and apply volume formula for pyramids & cones.

Volume

Watch the YouTube video on the projector. (also posted on Edline, right side of home page)

What does the person show about the similarities between the cube and the pyramid?

≅ bases, same height

The person in the video will now fill up the cube using full pours from the pyramid.

How many full ~~cones~~ pyramids did it take to fill the ~~cylinder~~ cube? 3

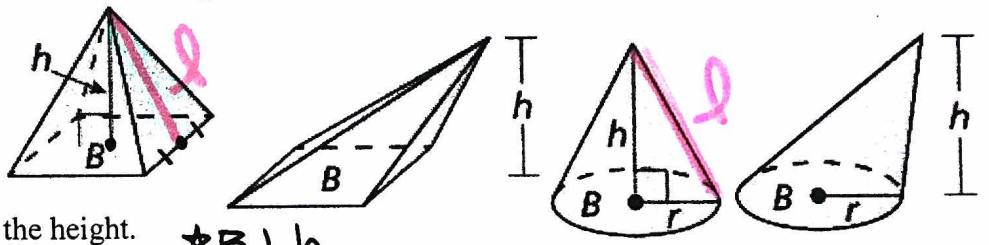
So... $\frac{3(\text{vol. pyramid})}{3} = \frac{\text{vol. prism}}{3}$

$\text{Vol. pyramid} = \frac{\text{vol. prism}}{3}$ → $\text{vol. pyramid} = \frac{Bh}{3}$

Volume of a Pyramid or Cone

The volume V of a pyramid or cone is $\frac{Bh}{3}$

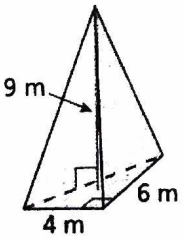
where B is the area of the base and h is the height.



★B⊥h

Examples:

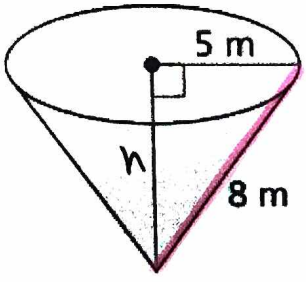
1. Find the volume of the pyramid.



$V = \frac{(\frac{1}{2}(4)(6))(9)}{3}$

$= 36\ m^3$

2. Find the volume of the cone. slant height (ℓ)



$8^2 = h^2 + 5^2$

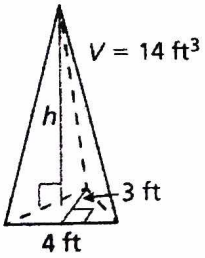
$h^2 = 39$

$h = \sqrt{39}$

$V = \frac{(\pi 5^2)(\sqrt{39})}{3}$

$\approx 163.49\ m^3$

3. Find the height of the triangular pyramid



$14 = \frac{(\frac{1}{2}(4)(3))(h)}{3}$

$14 = 2h \rightarrow h = 7$

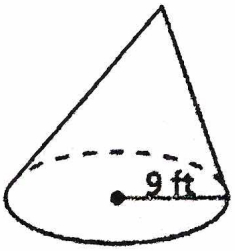
7 ft

4. Cone A and cone B are similar. Find the volume of cone B.

Cone A

$V = 15\pi \text{ ft}^3$

Cone B

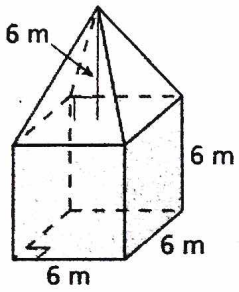


$$\frac{15\pi}{B} = \left(\frac{18}{39}\right)^3$$

$$\frac{15\pi}{B} = \frac{1}{27} \rightarrow \boxed{B = 405\pi \text{ ft}^3}$$

$$\approx 1272.35 \text{ ft}^3$$

5. Find the volume of the solid.



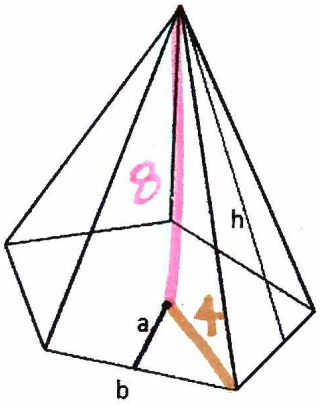
cube + pyramid

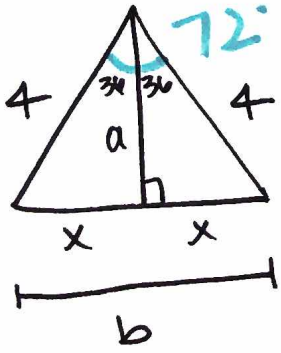
$$(6 \cdot 6)(6) + \frac{(6 \cdot 6)(6)}{3}$$

$$216 + 72$$

$$\boxed{288 \text{ m}^3}$$

6. Find the volume of a regular pentagonal ~~prism~~ pyr. with a height of 8 cm and whose base has a radius of 4 cm.





$\cos 36 = \frac{a}{4}$

$a \approx 3.2361$

$\sin 36 = \frac{x}{4}$

$x \approx 2.3511$

$b \approx 4.7022$

$$B = \frac{1}{2}(3.2361)[(4.7022)(5)]$$

$$\approx 38.0420$$

$$V = \frac{(38.0420)(8)}{3}$$

$$\boxed{V \approx 101.45 \text{ cm}^3}$$