Friday, June 5, 2020

Volumes of Composite Solids

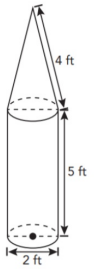
Composite Solid: A solid made up of two or more solids.

Volume of Composite Solids:

There are two basic methods to find the volume of a Composite Solid:

- Divide the solid into pieces. Find the volume of each piece, then add the volumes together.
- Picture the orginal solid as a larger solid then subtract the volumes of the "missing" pieces.

For the examples that will be shown we'll round Volume to the nearest hundredth.



Total Vol = Vol of cylinder + Vol of cone

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

$h = 5$ ft

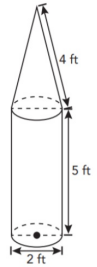
2ft = diameter

r = 2÷2 = 1 ft

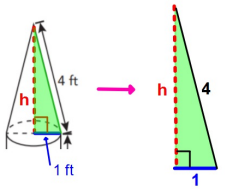
Vol cylinder $= \pi(1 \text{ ft})^2(5 \text{ ft}) = 5\pi \text{ ft}^3$

$= 15.71 \text{ ft}^3$

Cone: $V = \frac{1}{3}\pi r^2 h$ $r = 1$ ft same as cylinder



h:



$h^2 + 1^2 = 4^2$

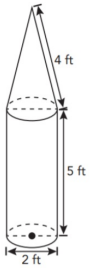
$h^2 = 4^2 - 1^2$

$h^2 = 16 - 1 = 15$

$h = \sqrt{15}$

Vol of cone $= \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(1)^2(\sqrt{15})$

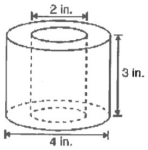
$= 4.06\ ft^3$



Total Volume = $15.71\ ft^3 + 4.06\ ft^3$

$= 19.77\ ft^3$

This is a cylinder with a hole drilled through it which means



Total Vol = (big cylinder) - (small cylinder)

big cylinder: $V = \pi r^2 h$

$h = 3$ in 4 in = dia

$r = 4 \div 2 = 2$ in

$V = \pi(2)^2 3 = \pi(4)3$

$= 12\pi\ in^3$

small cylinder: $V = \pi r^2 h$

$h = 3$ in 2 in = dia

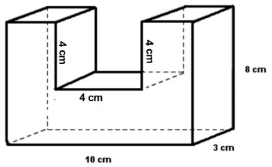
$r = 2 \div 2 = 1$ in

$V = \pi(1)^2 3 = \pi(1)3$

$= 3\pi\ in^3$

Total Vol = $12\pi - 3\pi = 9\pi = 28.27\ in^3$

All angles are right angles and the "gap" is centered on the front face.

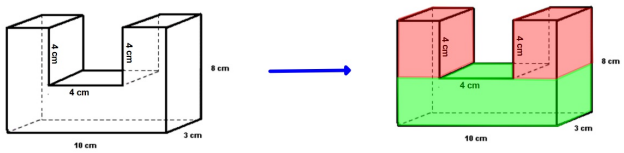


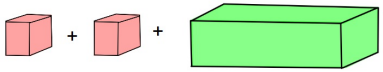
We'll find the volume of this Composite Solid two ways.

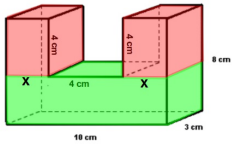
1. Divide it into 3 smaller solids and add the 3 volumes.

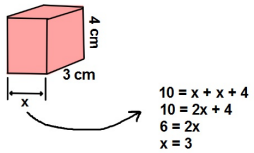
2. Make it into one larger solid and subtract the "missing" piece.

1. Divide it into 3 smaller solids and add the 3 volumes.



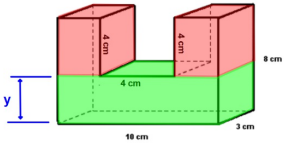
Total Volume =  + +

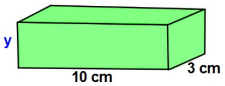




Vol of 1  = (3)(3)(4) = 36 cm^3

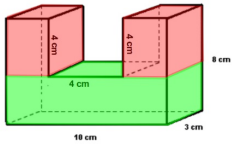
Vol of 2  = 2(36 cm^3) = 72 cm^3





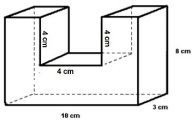
y = 8 cm - 4 cm = 4 cm

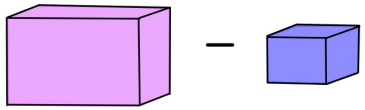
Vol = (10)(3)(4) = 120 cm^3

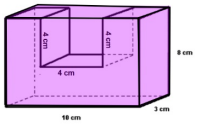


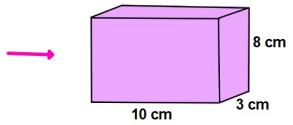
Total Vol = 72 cm^3 + 120 cm^3 = 192 cm^3

2. Make it into one larger solid and subtract the "missing" piece.

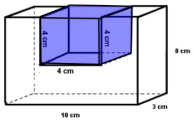


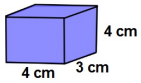
Total Vol = 





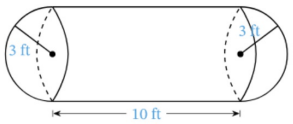
Vol = (10)(3)(8) = 240 cm^3





Vol = (4)(3)(4) = 48 cm^3

Total Volume = 240 cm^3 - 48 cm^3 = 192 cm^3



Total Vol = Cylinder + hemisphere + hemisphere

= Cylinder + 1 Sphere

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

$h = 10$ ft

$r = 3$ ft

$V = \pi(3)^2 10 = \pi(9)10$

$= 90\pi$ ft^3

Sphere: $V = \frac{4}{3}\pi r^3$

$r = 3$ ft same as the cylinder

$V = \frac{4}{3}\pi(3)^3 = \frac{4}{3}\pi(27)$

$= 36\pi$ ft^3

Total Vol = 90π ft^3 + 36π ft^3 = 126π ft^3

= 395.84 ft^3

You can now finish Practice #27 by doing problems 13 and 14.

This practice is due on Sunday, June 7 by 10:00 pm