Good morning!

1. "Here" Unit 3b Test this THURSDAY!

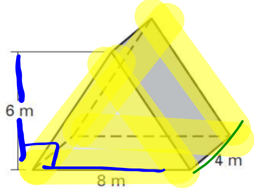
2. Notes on Spheres and Cavalieri's Principle

3. Sphere Practice for homework - turn in to CTLS

4. Quiz opens today at 2:00 PM

Find the Volumes

4.



$V = Bh$

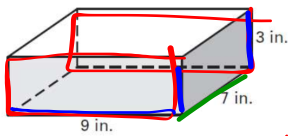
$\frac{1}{2}bh \cdot 4$

$\frac{1}{2}(8)(6) \cdot 4$

$\boxed{V = 96\,m^3}$

5.

Rectangular Prism



$V = Bh$

bh

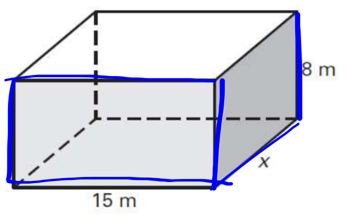
$9 \cdot 3 \cdot 7$

$\boxed{V = 189\,in^3}$

Working Backwards

Rectangular Prism

$V = 1440\ m^3$



$V = Bh$

$1440 = \underbrace{b \cdot h}_{B}\ h$

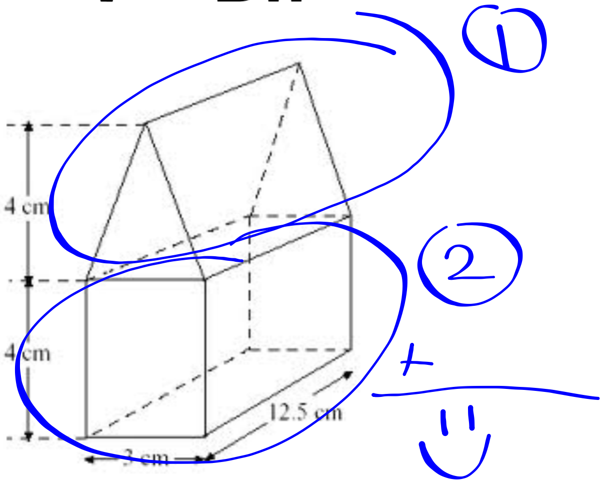
$1440 = 15 \cdot 8\, x$

$\boxed{x = 12\ m}$

Composite Solids

EX: Find the volume.

$$V = Bh$$



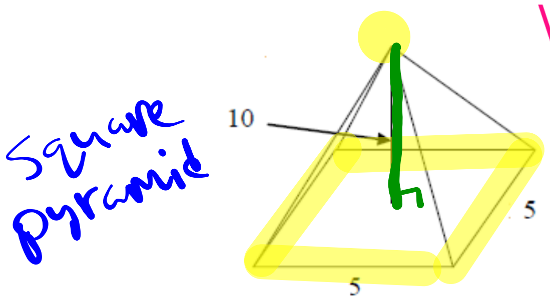
Volume of Pyramids

Volume of Pyramids

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

B stands for the area of the base

Find the volume and round to the nearest tenth.



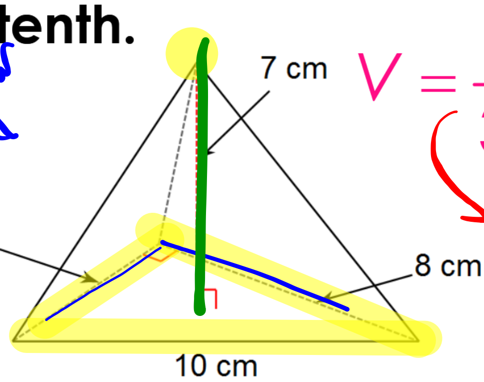
$$V = \frac{1}{3}Bh$$

$$\frac{1}{3}(5\cdot 5)10$$

$$V = \frac{250}{3} = 83.3 \text{ units}^3$$

Find the volume and round to the nearest tenth.

triangular pyramid



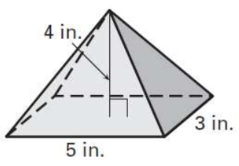
$V = \frac{1}{3}Bh$

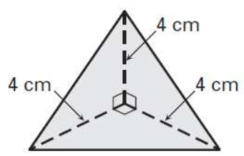
$\left(\frac{1}{2}bh\right)$

$\frac{1}{3} \cdot \frac{1}{2}(6)(8)(7)$

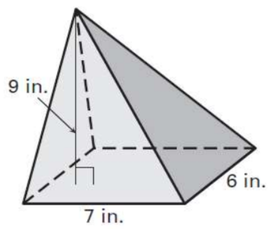
$\frac{\cancel{6} \cdot 8 \cdot 7}{\cancel{6} \cdot 3 \cdot 2} = \boxed{56 cm^3}$

Find the Volumes





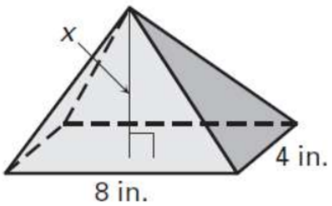
Find the Volume



$\boxed{\text{Working Backwards}}$

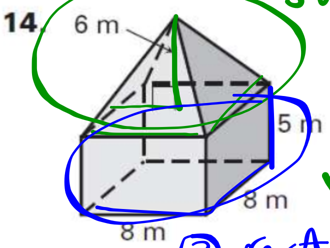
Find the value of *x*.

$V = 64 \text{ in.}^3$



Composite Solids

14.



① Square pyramid

$\frac{1}{3}Bh$

$\frac{1}{3}\,\underbrace{8\cdot 8}\cdot 6$

$V = 128\ m^3$

② rectangular Prism

$V = Bh$

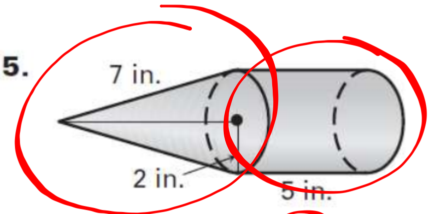
$\underbrace{8\cdot 8}\ 5$

$V = 320\ m^3$

128
+320

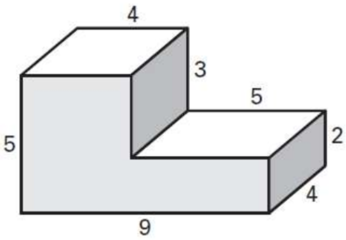
$\boxed{V = 448\ m^3}$

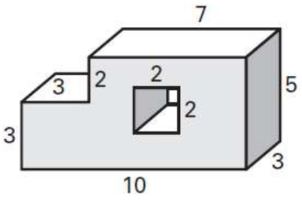
15.



① + ② = ______

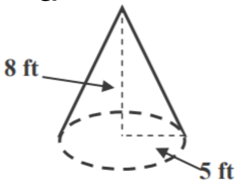
Composite Solids





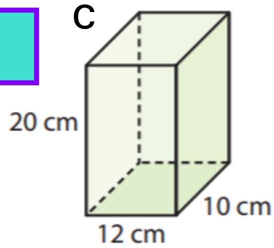
Volume of Spheres
Caveleri's Principle

a



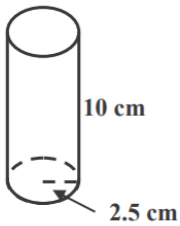
Warm UP

c

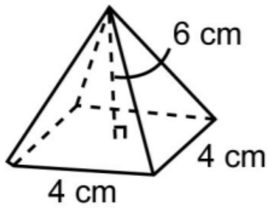


round all to the nearest
tenth :)

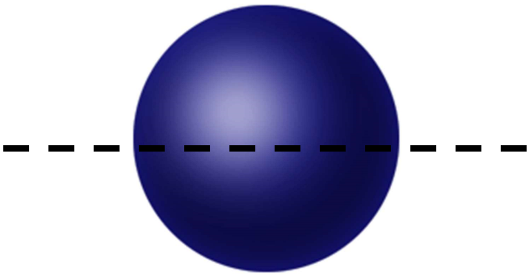
b

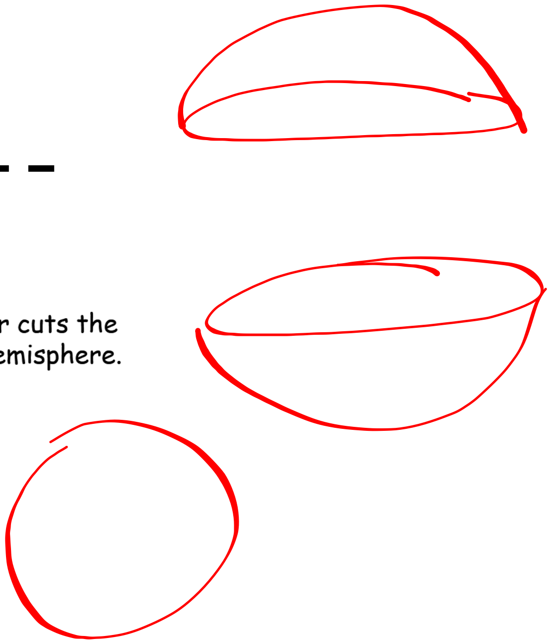


d



If you cut a sphere right down the middle you would create two congruent halves called HEMISPHERES.





You can think of the globe. The equator cuts the earth into the northern and southern hemisphere.

2-D

Look at the cross section formed when you cut a sphere in half.

What shape is it?

A circle!!! This is called the GREAT CIRCLE of the sphere.


The only thing
flat-earthers have to fear
is sphere itself.

Formula for Volume of a Sphere

# #

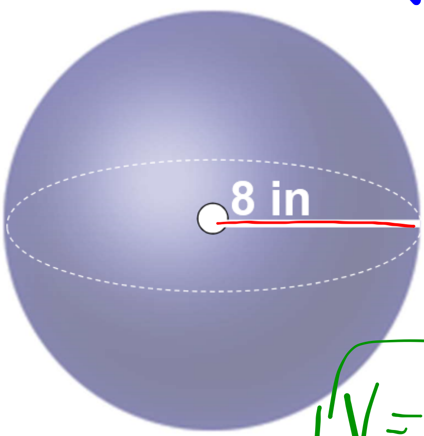
$$\boxed{V = \frac{4}{3}\pi r^3}$$

cubic units

ft^3, cm^3, in^3, ...

Find the Exact Volume:

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



$r = 8$

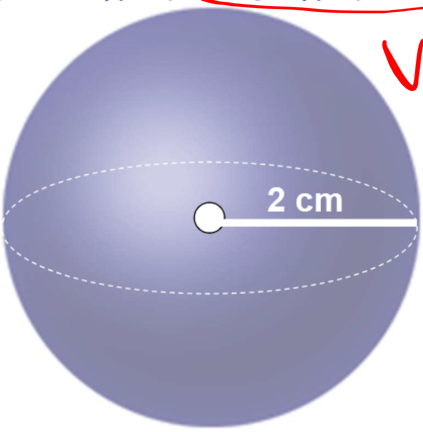
$\frac{4}{3}\pi(8)^3$

$8 \cdot 8 \cdot 8 \cdot 4 \div 3 =$

$\boxed{V = \frac{2048}{3}\pi \text{ in}^3}$

Find the volume

(round to the nearest hundredth):

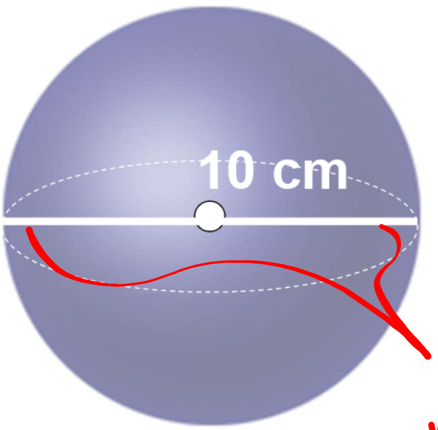


$V = \frac{4}{3}\pi(2)^3$

$V = 33.51\ cm^3$

Find the Exact Volume

Beware the diameter!



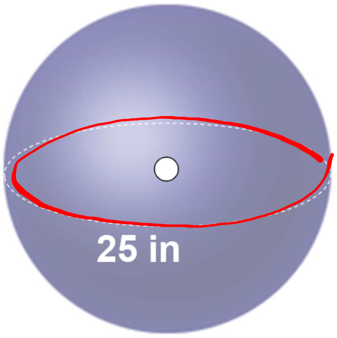
$D = 10$

$r = 5$

$V = \frac{4}{3}\pi(5)^3$

$\boxed{V = \frac{500}{3}\pi \text{ cm}^3}$

The circumference of a great circle of a sphere is 25 inches. Find the volume of (2) the sphere. (Round to the nearest tenths.)



$$C = 2\pi r$$

$$\frac{25}{2\pi} = \frac{2\pi r}{2\pi} \quad (1)$$

$25 \div 2 \div \pi = r$

$4.0 = r$

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

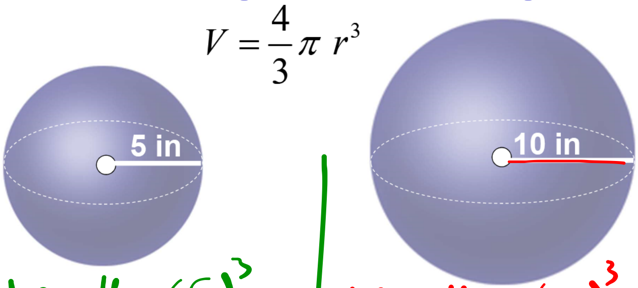
$= \frac{4}{3}\pi (4)^3$

$\boxed{V = 268.1 \text{ in}^3}$

Volume of a Sphere

A spherical balloon has an initial radius of 5 in. When more air is added, the radius becomes 10 in. Explain how the volume changes as the radius changes.

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



$V = \frac{4}{3}\pi(5)^3$

$V = 523.6 \text{ in}^3$

$V = \frac{4}{3}\pi(10)^3$

$V = 4188.8 \text{ in}^3$

Doubled radius

$5(2) = 10$

$25\pi(4) = 100\pi$

$523.6(8) = 4188.8$

$\frac{4188.8}{523.6} = 8$

$K = 2$

Perimeter sides $A : B$

Area $A^2 : B^2$ $K^2 = 2^2 = 4$

Volume $A^3 : B^3$ $K^3 = 2^3 = 8$

radius $1 \rightarrow 2$

$14 \rightarrow 56$

Volumes $14^3 \rightarrow 56^3$

Volume of a Sphere

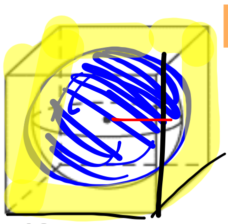
A sphere has an initial volume of 400 $cm.^3$ The sphere is made bigger by making the radius 4 times as big. What is the new volume of the sphere?

Volume of a Sphere

A sphere is inscribed in a cube-shaped box as pictured below. To the nearest centimeter, what is the volume of the empty space in the box?

10th place

Beware the diameter



16 cm.

① Cube

$V = 16 \cdot 16 \cdot 16$

$V = 4096$

$r = \frac{16}{2} = 8$

② Sphere

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

$V = \frac{4}{3}\pi (8)^3 = 2144.7$

① − ②

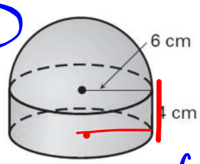
$4096 - 2144.7$

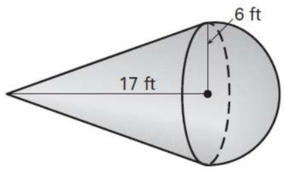
$\boxed{= 1951.3 \text{ cm}^3}$

Composites with HEMISPHERES

Beware the hemisphere

① ②





$\frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$

$V = \frac{2}{3}\pi r^3$

$\frac{2}{3}\pi(6)^3$

$V = 144\pi$

$V = \underbrace{B}_{\pi r^2}h$

$\pi(6)^2(4)$

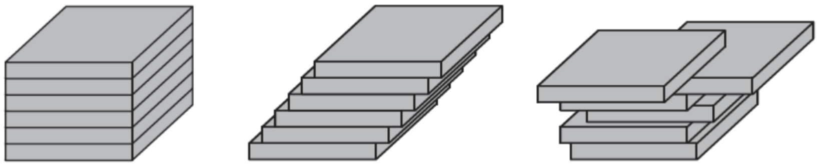
$V = 144\pi$

$V = 144\pi + 144\pi = \boxed{288\pi}$

Cavalieri's Principle

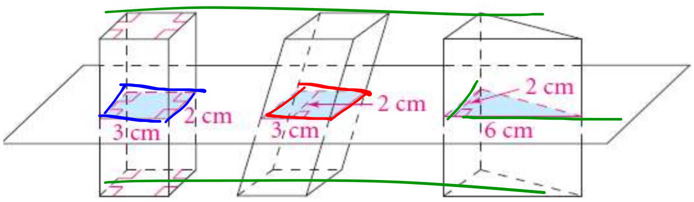
The volumes of two objects of the same height are equal if the areas of their corresponding cross sections are equal

"The reviews are in. Math doesn't look any better in 3-D."



These pieces maintain their SAME volume regardless of how they are moved.

Cavalieri's Principle Examples



SAME Volume

$A_{\square} = 3 \cdot 2 = 6\,cm^2$

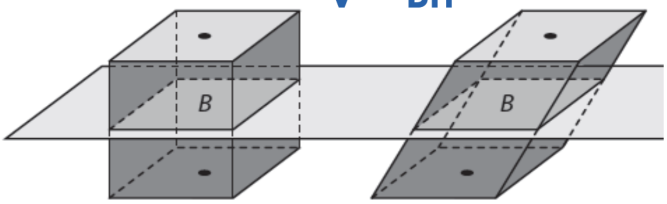
$A_{\square} = 3 \cdot 2 = 6\,cm^2$

$A_{\triangle} = \frac{1}{2}bh = \frac{1}{2}2 \cdot 6 = 4\,cm^2$

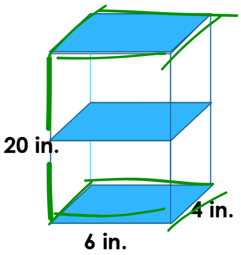
Cavalieri's Principle Examples

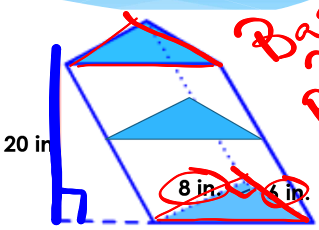
The same volume formula applies whether it's a right prism or an oblique prism.

$V = Bh$



Example 1: Which solid has more volume? Use Cavalieri's Principle.





Base Triangular Prism

2 Base

$V = Bh$

$6 \cdot 4 \quad 20$

$24 \cdot 20$

480 in^3

$h = 20\text{in}$

$V = Bh$

$\frac{1}{2}bh$

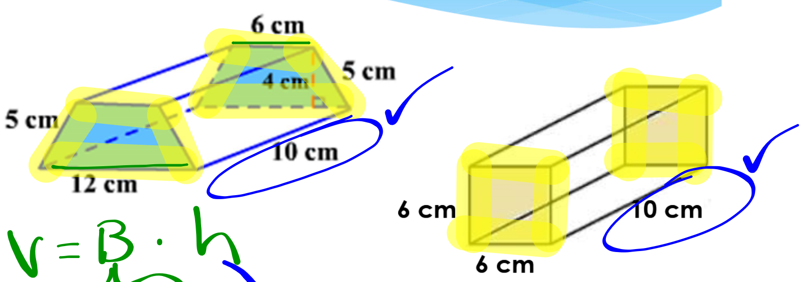
$\frac{1}{2}(8)(6)\,20$

$(24) \cdot 20$

480 in^3

Example 2: Which solid has more volume? Use Cavalieri's Principle.

$A_{\square} = \frac{1}{2}(b_1+b_2)\cdot h$



$V = B \cdot h$

$\frac{1}{2}(6+12)\cdot 4 \quad 10$

$36 \cdot 10$

$V = 360\,cm^3$

$V = B\,h$

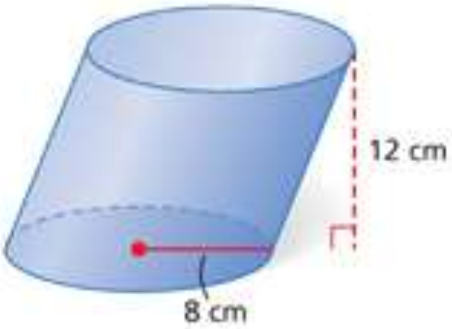
$(6\cdot 6)\cdot 10$

$36 \cdot 10$

360

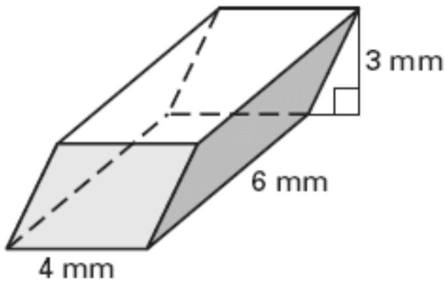
3. Find the volume to the nearest tenth.

$V = Bh$



4. Find the volume to the nearest tenth.

$V = Bh$



1. Sphere Practice
2. Volume Quiz @ 2:00 PM