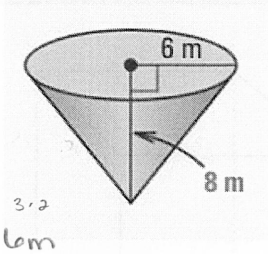
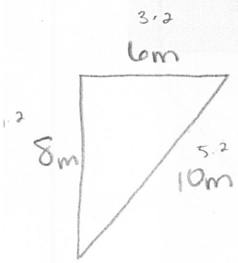
Example #5: Find the surface area of the right cone. → $SA = B + \frac{1}{2}C\ell$





$SA = (\pi \cdot 6^2) + \cancel{\tfrac{1}{2}}(\cancel{2}\pi \cdot 6)(10)$

$SA = 36\pi + 60\pi$

$\boxed{SA \approx 301.59\ m^2}$

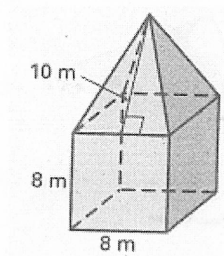
$6^2 + 8^2 = \ell^2$

$\ell = \sqrt{6^2 + 8^2}$

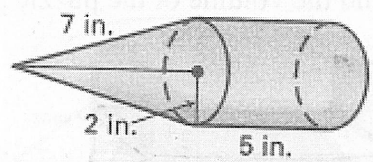
$\ell = 10m$

Example #6: Find the surface area of the solid. The pyramids are regular and the cones are right. Round your answer to the nearest hundredth, if necessary.

a.)



b.)



Cube: (5 sides)

SA of one side $= 8(8)$

$= 64\ m^2$

SA of 5 sides $= 5(64)$

$= 320 m^2$

Pyramid: (no base)

$SA = \cancel{B} + \frac{1}{2}P\ell$

$P = 8(4)$

$P = 32m$ $\ell = 10m$

$SA = \frac{1}{2}(32)(10)$

$= 160\ m^2$

$\boxed{\text{Total } SA = 320 + 160 = 480\ m^2}$

Cylinder: (only 1 base)

$SA = \cancel{2}B + Ch$

$SA = (\pi \cdot 2^2) + (2\pi \cdot 2)(5)$

$SA = 4\pi + 20\pi$

$SA = 24\pi\ in^2$

Cone: (No base)

$SA = \cancel{B} + \frac{1}{2}C\ell$

$SA = \cancel{\tfrac{1}{2}}(\cancel{2}\pi \cdot 2)(7)$

$SA = 14\pi\ in^2$

Total $SA = 24\pi + 14\pi$

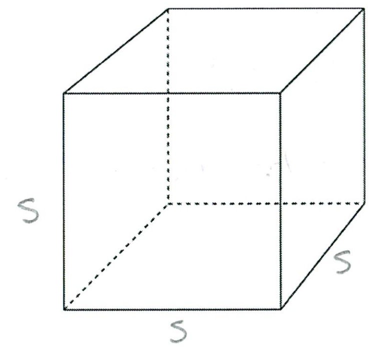
$SA = 38\pi\ in^2$ ← Exact

$SA \approx 119.38\ in^2$ ← Approx

Chapter 12.4: Volume of Prisms and Cylinders

Volume: the number of cubic units contained in its interior.

Measured in cubic units → in^3, cm^3, ft^3



Volume of a Cube (Postulate 27):

The volume of a cube is the cube of the length of its side. $V = s^3$

Volume Congruence Postulate (Postulate 28):

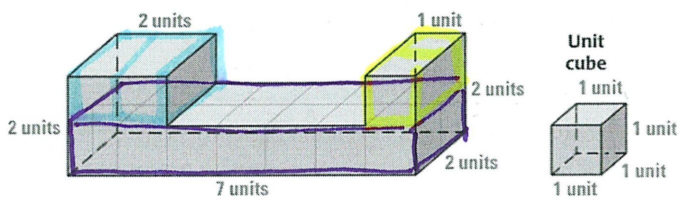
If two polyhedral are congruent, then they have the same volume.

Volume Addition Postulate (Postulate 29):

The volume of a solid is the sum of the volumes of all its nonoverlapping parts.

(Example #1)

Example #1: Find the volume of the puzzle piece in cubic units.



Volume of Bottom = 14 $unit^3$

Volume of top left = 4 $unit^3$

Volume of top right = 2 $units^2$

Total Volume = 14 + 4 + 2

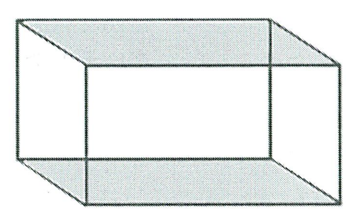
$\boxed{V = 20\ unit^3}$

Volume of a Prism (Theorem 12.6):

The volume V of a prism is $V = B \cdot h$

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

(Base Area formula used will depend on the shape of the base)

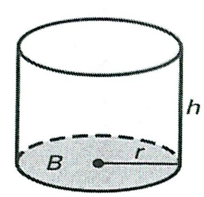


Volume of a Cylinder (Theorem 12.7):

The volume V of a cylinder is $V = B \cdot h$

Where B is the area of a base, h is the height, and r is the radius of a base.

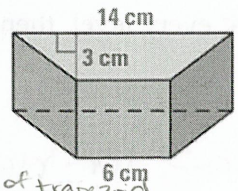
$B = \pi r^2$ (everytime)



$V = B \cdot h$

Example #2: Name each solid then find the volume. Round your answer to two decimal places, if necessary.

a.)



5 cm = h (of prism)

6 cm of trapezoid

Base Area = $\frac{1}{2}(h)(b_1+b_2)$

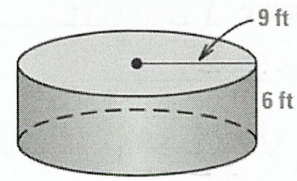
$B = \frac{1}{2}(3)(14+6)$

$B = 30 cm^2$

$V = 30(5)$

$\boxed{V = 150 cm^3}$

b.)

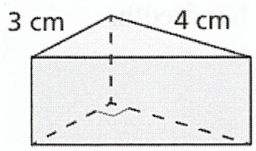


$V = (\pi \cdot 9^2)(6)$

$V = 486\pi \ ft^3$ ← Exact

$V \approx 1526.81 \ ft^3$ ← Approx

c.)



2 cm = h (of prism)

base + height of triangle

Base Area = $\frac{1}{2}bh$

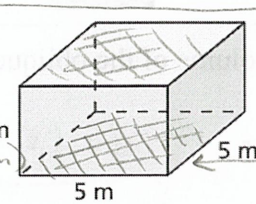
$B = \frac{1}{2}(3)(4)$

$B = 6cm^2$

$V = 6(2)$

$\boxed{V = 12 \ cm^3}$

d.)



Bases of prism

h=3 m (of prism)

Base Area = $l \cdot w$

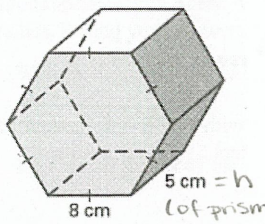
$B = (5)(5)$

$B = 25 m^2$

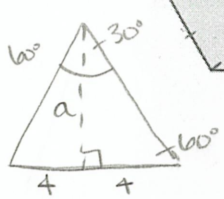
$V = 25(3)$

$\boxed{V = 75 m^3}$

e.)



5 cm = h (of prism)



special Δ or

Base Area = $\frac{1}{2} \cdot a \cdot P$ → $B = \frac{1}{2}(4\sqrt{3})(48)$

$P = 8(6)$

$P = 48cm$

$a = 4\sqrt{3}cm$

$\tan 30° = \frac{4}{a} \Rightarrow a = \frac{4}{\tan 30°}$

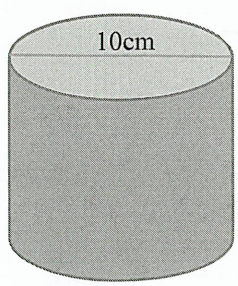
$a \approx 6.93cm$

$B \approx 166.28 \ cm^2$

$V = (166.28)(5)$

$\boxed{V \approx 831.38 \ cm^3}$

Example #3: The volume of the right cylinder is 200π cm³. Find the height. ⇒ $V = B \cdot h$



$r = 5cm$

$h = ?$

$200\pi = (\pi \cdot 5^2) \cdot h$

$\frac{200\pi}{25\pi} = \frac{25\pi h}{25\pi}$

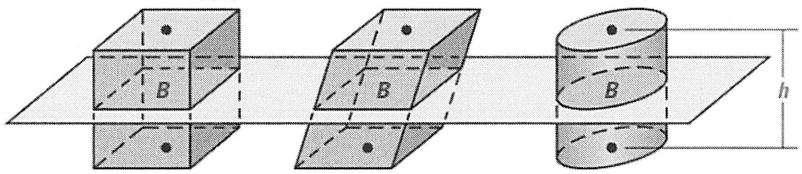
$\boxed{h = 8cm}$

Cavalieri's Principle (Theorem 12.8):

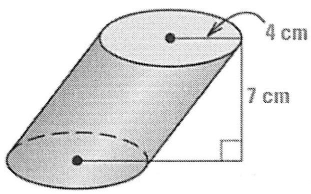
If two solids have the same height and the same cross-sectional area at every level, then they have the same volume

Which means… the VOLUME (Not Surface Area) formulas for right Solid also work for oblique solids

smaller→



Example #4: Find the volume of the oblique cylinder. Round answers to the nearest hundredth.



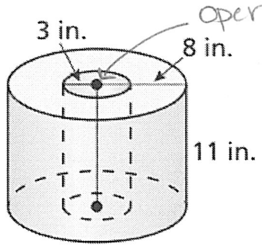
$V = (\pi \cdot 4^2)(7)$

$\boxed{V = 112\pi \text{ cm}^3 \leftarrow \text{Exact} \quad V \approx 351.86 \text{ cm}^3 \leftarrow \text{Approx}}$

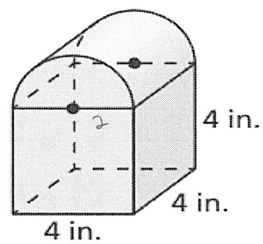
↑

Example #5: Find the volume of each solid. Round answers to the nearest hundredth.

a.)



b.)



Outside Cylinder $= (\pi \cdot 8^2)(11)$

$V = 704\pi \text{ in}^3$

Inside Cylinder $= (\pi \cdot 3^2)(11)$

$V = 99\pi \text{ in}^3$

Total Volume = outside − inside

$V = 704\pi - 99\pi$

$\boxed{V = 605\pi \text{ in}^3 \leftarrow \text{Exact} \quad V \approx 1900.66 \text{ in}^3 \leftarrow \text{Approx}}$

Cube Volume $= 4^3$

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

½ Cylinder Volume $= \frac{1}{2}(\pi \cdot 2^2)(4)$

$V = 8\pi \text{ in}^3$

Total Volume = Cube + ½ Cylinder

$\boxed{V = 64 + 8\pi \leftarrow \text{Exact} \quad V \approx 89.13 \text{ in}^3 \leftarrow \text{Approx}}$