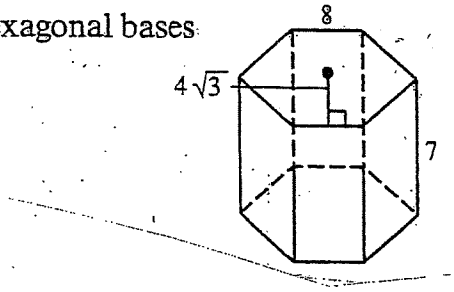
Chap Practice Exam KEY

* Extra Practice is optional.

Find the volume and surface area of each solid.

#1-3 Key: See Lesson on Prisms & Cylinders

1) regular hexagonal bases

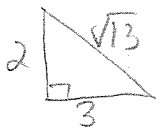


$V = Bh$
$= \frac{1}{2}ap(h)$
$= \frac{1}{2}(4\sqrt{3})48(7)$
$V = 672\sqrt{3}$

$TA = LA + 2B$
$= 8(6)(7) + 2(\frac{1}{2}ap)$
$= 336 + 4\sqrt{3}(48)$
$TA = 336 + 192\sqrt{3}$

(2) A prism has a volume of 420 cm^3. Its base is a right triangle with sides of length 2, 3, $\sqrt{13}$. Find the height of the prism.

Base



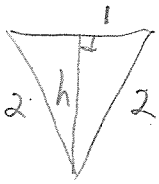
$V = BH$
$= \frac{1}{2}bhH$
$420 = \frac{1}{2}(2)(3)H$
$140 = H$

4+9

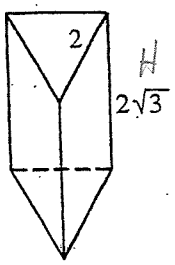
Extra Practice: Find TA.

$TA = LA + 2B$
$= ph + 2B$
$= (5+\sqrt{13})140 + 2(3)$
$= 706 + 140\sqrt{13}$

(3) equilateral triangle bases



$1^2 + h^2 = 2^2$
$h^2 = 3$
$h = \sqrt{3}$



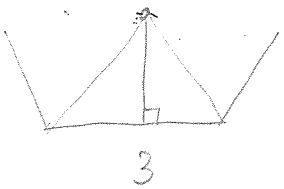
$V = BH$
$= \frac{1}{2}bhH$
$= \frac{1}{2}(2)\sqrt{3}(2)\sqrt{3}$
$= 6$ cu. units

$TA = LA + 2B$
$= 6(2\sqrt{3}) + 2(\frac{1}{2}(2)\sqrt{3})$
$= 12\sqrt{3} + 2\sqrt{3}$
$= 14\sqrt{3}$ sq. units

(4) #485

Key: See lesson on pyramids.

A regular octagonal pyramid has base edge 3 m and lateral area 60 m^2. Find its slant height.



$LA = \frac{1}{2}pl$

$60 = \frac{1}{2}24l$

$5 = l$

Extra Practice: Find its TA and volume.

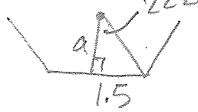
$TA = LA + B$ ← need

$= LA + \frac{1}{2}aP$

$= 60 + \frac{1}{2}(3.6213)(24)$

$= 103.4558$

Find a:



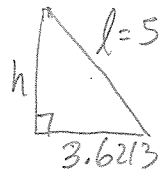
$\tan 22\frac{1}{2} = \frac{1.5}{a}$

$a \approx 3.6213$

$V = \frac{1}{3}Bh$ ← need altitude

$= \frac{1}{3}(43.4558)$

$V \approx 49.93$

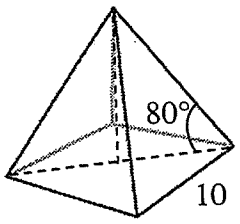


$h^2 + 3.6213^2 = 5^2$

$h^2 \approx 11.8861$

$h \approx 3.447$

(5) Find the volume of the regular square pyramid. Round the answer to the nearest tenth.



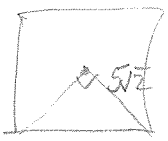
$V = \frac{1}{3}Bh$

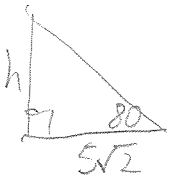
$= \frac{1}{3}e^2h$

$= \frac{1}{3}100(5\sqrt{2})\tan 80$

$= 1336.7339$

1336.7



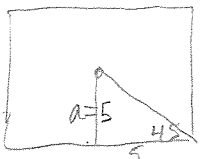


$\tan 80 = \frac{h}{5\sqrt{2}}$

$5\sqrt{2}\tan 80 = h$

$40.1020833 \approx h$

Extra Practice: Find the slant ht.



→ apothem = 5

$h^2 + a^2 = l^2$

$(5\sqrt{2}\tan 80)^2 + 5^2 = l^2$

$1633.7187 = l^2$

$l \approx 40.4125$

(6) #697

Key: WS "More Area & Volume"

A 240° sector is cut out of a circular paper with radius 6 in. and bent to form the lateral surface of a cone. What is the volume of the cone?

slant ht of cone: $l = 6$

A of cut out $= \frac{2}{3}\pi 6^2$

$= 24\pi$

This is lateral area

$LA = \pi r l$

$\pi r l = 24\pi$

$\pi r(6) = 24\pi$

$r = 4$

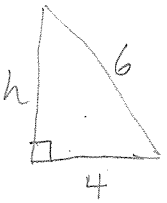
↑ radius of base of cone.

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

$= \frac{1}{3}\pi r^2 h$ ←

$= \frac{1}{3}\pi 4^2(2\sqrt{5})$

$V = \frac{32\pi\sqrt{5}}{3}$



$h^2 + 4^2 = 6^2$

$h^2 = 20$

$h = 2\sqrt{5}$

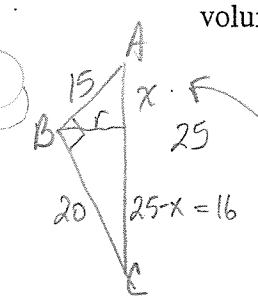
Extra Practice: $TA = LA + B$

$= 24\pi + \pi 4^2$

$= 40\pi$

(7)

In ΔABC, AB = 15, AC = 25 and BC = 20. The triangle is rotated about leg $\overline{AC}$. Find the volume of the resulting solid.



$\frac{15}{x} = \frac{25}{15}$

$25x = 225$

$x = 9$

$\frac{r}{9} = \frac{16}{r}$

$r^2 = 144$

$r = 12$

$V_{TOP} + V_{BOTTOM} = V_{SOLID}$

$\frac{1}{3}\pi 12^2 9 + \frac{1}{3}\pi 12^2 16 =$

$432\pi + 768\pi = V_{SOLID}$

$1200\pi = V_{SOLID}$

Extra Practice: Find TA.

$TA = LA_{TOP} + LA_{bottom}$

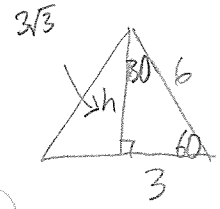
$= \pi r \ell_{TOP} + \pi r \ell_{bottom}$

$= \pi(12)15 + \pi(12)(20)$

$TA = 420\pi$

(8)

An equilateral triangle with 6 cm side lengths is rotated about an altitude. Find the volume of the resulting solid.



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

$= \frac{1}{3}\pi 3^2 (3\sqrt{3})$

$V = 9\pi\sqrt{3}$

Extra Practice: Find its TA.

$TA = LA + B$

$= \pi r \ell + \pi r^2$

$= \pi(3)(6) + \pi 3^2$

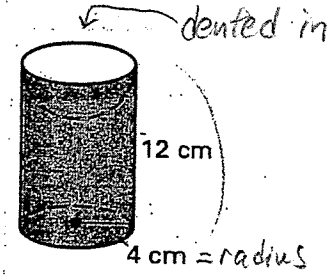
$TA = 27\pi$

(9)

Find the area and volume of each figure.

Key: spheres WS

#10



$V = V_{CYL} - V_{\frac{1}{2}sphere}$

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

$= \pi 4^2(12) - \frac{1}{2}\left(\frac{4}{3}\pi 4^3\right)$

$= 192\pi - \frac{128}{3}\pi$

$V = \frac{448}{3}\pi$

$TA = LA + B + \text{hemisphere}$

$= 2\pi r h + \pi r^2 + \frac{1}{2} \cdot 4\pi r^2$

$= 2\pi(4)12 + 16\pi + \frac{1}{2} \cdot 4\pi 4^2$

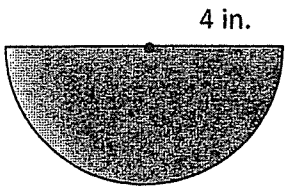
$= 96\pi + 16\pi + 32\pi$

$TA = 144\pi$

10.

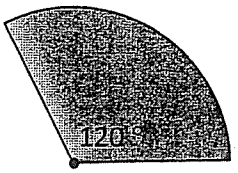
Cone-shaped paper cups can be manufactured from patterns in the shape of sectors of circles. The figures below show two patterns. The first is cut with a straight angle. The second is cut with an angle measuring 120°. Find the area of each base.

a)



$l = 4$

b)



$l = 4$

1. Find the lateral area for each cone.

base

$LA = \pi r l$

$= \pi(2)(4)$

$= \boxed{8\pi}$

$A_{\frown} = \frac{1}{2}\pi r^2$

$= \frac{1}{2}\pi 16$

$= 8\pi$

$8\pi = \pi r l$ ← LA

$2 = r_{base}$

$A_{base} = \pi 2^2$

$= 4\pi$

Area base

$A = \frac{120}{360}\pi r^2$

$\frac{1}{3}\pi 16$

$= \frac{16}{3}\pi$

$\pi r l = \frac{16}{3}\pi$

$4\pi r = \frac{16}{3}\pi l$

$r = \frac{4}{3}$

$A_{base} = \pi\left(\frac{4}{3}\right)^2$

$= \boxed{\frac{16}{9}\pi}$

$LA = \pi r l$

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

$= \frac{16}{3}\pi$

Find its height.

Extra Practice

$h^2 + \left(\frac{4}{3}\right)^2 = 4^2$

$h^2 = 16 - \frac{16}{9}$

$= \frac{144}{9} - \frac{16}{9}$

$h^2 = \frac{128}{9}$ $= \boxed{\frac{8\sqrt{2}}{3} = h}$