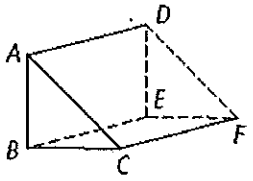
Name ANSWERS Class _____ Date _____

# GEO 21 ☺ Extra Practice

Chapter 11

## Lesson 11-1

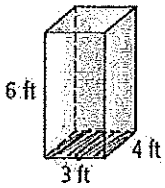
1. Look at the polyhedron at the right.
   a. How many vertices are there? List them. (6) pts. A, B, C, D, E, F
   b. How many edges are there? List them. (9) $\overline{AB}, \overline{BC}, \overline{CA}, \overline{AD}, \overline{CF}, \overline{BE}, \overline{DE}, \overline{DF}, \overline{EF}$
   c. How many faces are there? List them. (5) $\triangle ABC$, $\triangle DEF$, $\square ADFC$, $\square FCBE$, $\square ADEB$




## Lessons 11-2 and 11-3

**Find the (a) lateral area and (b) surface area an (c) volume of each figure. Leave your answers in terms of $\pi$ or in simplest radical form.**

6.




$B = (3)(4) = 12$

$P = 3+4+3+4 = 14$

$H = 6$

$SA = PH + 2B$

$(14)(6) + 2(12)$

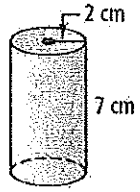
$84 + 24 =$ 108 ft² = SA, 84 = LA ft²

$V = BH$

$(12)(6)$

72 ft³

7.




$B = \pi(2)^2 = 4\pi$

$C = 4\pi$

$H = 7$

$SA = CH + 2B$

$(4\pi)(7) + 2(4\pi)$

$28\pi + 8\pi$

$36\pi$ cm²

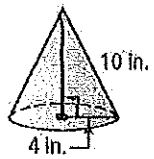
$V = BH$

$V = (4\pi)(7)$

$28\pi$

LA = $28\pi$

8.




$B = \pi(4)^2$

$16\pi$

$r = 4$

$\ell = 10$

$H = 2\sqrt{21}$

$4^2 + H^2 = 10^2$

$16 + H^2 = 100$

$H^2 = 84$

$H = 2\sqrt{21}$

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

$\pi(4)(10) + \pi(4^2)$

$40\pi + 16\pi$

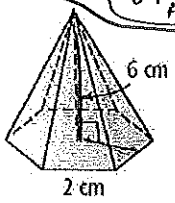
SA = $56\pi$ in²

LA = $40\pi$ in²

$V = \frac{BH}{3} = \frac{(16\pi)(2\sqrt{21})}{3}$

$\frac{32\pi\sqrt{21}}{3}$ in³

9.




$P = 12$

$B = \frac{1}{2}ap$

$\frac{1}{2}(\sqrt{3})(12)$

$6\sqrt{3}$

$H = 6$

$\ell \Rightarrow \ell^2 = 6^2 + (6\sqrt{3})^2$

$\ell^2 = 36 + (36 \cdot 3)$

$36 + 108$

$\ell^2 = 144$

$\ell = 12$

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

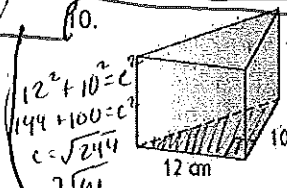
$\frac{1}{2}(12)(12) + 6\sqrt{3}$

SA = $72 + 6\sqrt{3}$ cm²

LA = 72 cm²

$V = \frac{BH}{3} = \frac{(6\sqrt{3})(6)}{3} = 12\sqrt{3}$ cm³

10.




$12^2 + 10^2 = c^2$

$144 + 100 = c^2$

$c = \sqrt{244}$

$2\sqrt{61}$

37.62

$P = 22 + 2\sqrt{61}$

15.62

$B = 60$

$H = 9$

$SA = PH + 2B$

$(37.62)(9) + 2(60)$

$338.58 + 120$

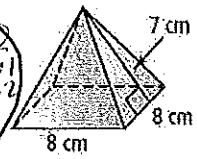
SA = 458.58 cm²

LA = 338.58

$V = BH$

$(60)(9) =$ 540 cm³

11.




$B = 64$

$P = 32$

$\ell = 7$

$H =$

$4^2 + H^2 = 7^2$

$16 + H^2 = 49$

$H^2 = 33$

$H = 5.74$

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

$\frac{1}{2}(32)(7) + 64$

$112 + 64$

SA = 176 cm²

LA = 112 cm²

$V = \frac{BH}{3} = \frac{(64)(5.74)}{3}$

122.45 cm³

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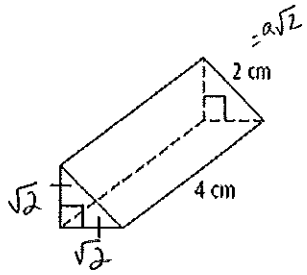
## Extra Practice (continued)

Chapter 11

$a = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2}$

**15.** An optical instrument contains a triangular glass prism with the dimensions shown at the right. Find the lateral area and surface area of the prism. Round to the nearest tenth.




$LA = pH = (4.83)(4) = 19.31 \text{ cm}^2$

$SA = pH + 2B$

$19.31 + 2(1)$

$21.31$

$\approx 21.3 \text{ cm}^2$

$B = \frac{1}{2}(\sqrt{2})(\sqrt{2})$

$\frac{1}{2}(2) = 1$

$H = 4$

$p = \sqrt{2} + \sqrt{2} + 2$

$2\sqrt{2} + 2$

$4.83$

**16.** A company packages salt in a cylindrical box that has a diameter of 8 cm and a height of 13.5 cm. Find the lateral area and surface area of the box. Round to the nearest tenth.


$LA = BH$

$(8\pi)(13.5)$

$108\pi$

$r = 4$

$C = 8\pi$

$B = 16\pi$

$H = 13.5$

$\text{Label} = 339.29 \text{ cm}^2$

$V = BH$

$(16\pi)(13.5)$

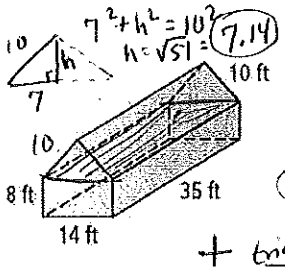
$216\pi$

$678.58 \text{ cm}^3$ of salt

## Extra Practice (continued)

Chapter 11

**26.** A greenhouse has the dimensions shown in the figure. What is the volume of the greenhouse? Round to the nearest cubic foot.




rect prism

$V = BH$

$(490)(8)$

$3920 \text{ ft}^3$

$B = (14)(35) = 490$

$H = 8$

+ triang. prism

$V = (49.99)(35)$

$V = 1749.65$

$B = \frac{1}{2}bh$

$\frac{1}{2}(14)(7.14)$

$49.99$

$H = 35$

$5669.65 \approx 5670 \text{ ft}^3$


$r = 3.75$

**27.** Find the volume of a can of chicken broth that has a diameter of 7.5 cm and a height of 11 cm. Round to the nearest tenth.

$V = BH$

$B = \pi(3.75)^2$

$14.0625\pi$

$B = 44.18$

$H = 11$

$V = 485.97$

$486.0$

**28.** A paper drinking cup is a cone that has a diameter of $2\frac{1}{2}$ in. and a height of $3\frac{1}{2}$ in. How many cubic inches of water does the cup hold when it is full to the brim? Round to the nearest tenth.

$d = 2.5$

$r = 1.25$

$H = 3.5$

$B = 1.5625\pi$

$4.91$

$V = \frac{BH}{3} = \frac{(4.91)(3.5)}{3}$

$5.73 \text{ in}^3$

**Lesson 11-6** $V = \frac{4\pi r^3}{3}$ $SA = 4\pi r^2$

**Find the volume and surface area of a sphere with the given radius or diameter. Give each answer in terms of π and rounded to the nearest whole number.**

**30.** $r = 5$ cm

$V = \frac{4\pi(5^3)}{3} = \frac{500\pi}{3} \approx 524$

$SA = 4\pi(5)^2 = 100\pi \approx 314$

**31.** $r = 3$ ft

$V = \frac{4\pi(3^3)}{3} = 36\pi \approx 113$

$SA = 4\pi(3)^2 = 36\pi \approx 113$

**32.** $d = 8$ in. $r = 4$

$V = \frac{4\pi(4)^3}{3} = \frac{256\pi}{3} \approx 268$

$SA = 4\pi(4)^2 = 64\pi \approx 201$

**33.** $d = 2$ ft $r = 1$

$V = \frac{4\pi(1)^3}{3} = \frac{4\pi}{3} \approx 4$

$SA = 4\pi(1)^2 = 4\pi \approx 13$

**34.** $r = 0.5$ in.

$V = \frac{4\pi(.5)^3}{3} = \frac{.5\pi}{3} \approx .52$

$SA = 4\pi(.5)^2 = \pi \approx 3$

**35.** $d = 9$ $r = 4.5$

$V = \frac{4\pi(4.5)^3}{3} = 121.5\pi \approx 382$

$SA = 4\pi(4.5)^2 = 81\pi \approx 254$

**The surface area of each sphere is given. Find the volume of each sphere in terms of $\pi$.**

36. $\frac{64\pi m^2}{4\pi} = \frac{4\pi r^2}{4\pi}$

$16 = r^2$

$r = 4$

37. $\frac{16\pi in.^2}{4\pi} = \frac{4\pi r^2}{4\pi}$

$4 = r^2$

$r = 2$

38. $\frac{49\pi ft^2}{4\pi} = \frac{4\pi r^2}{4\pi}$

$12.25 = r^2$

$3.5 = r$ or $\frac{49}{4} = r^2$ or $r = \frac{7}{2}$

39. A spherical beach ball has a diameter of 1.75 ft when it is full of air. What is the surface area of the beach ball, and how many cubic feet of air does it contain? Round to the nearest hundredth.

$r = .875$

$SA = 4\pi r^2$

$4\pi(.875)^2$

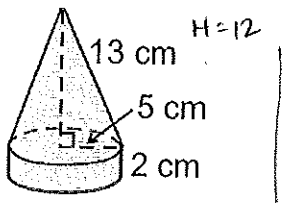
$9.62\ ft^2$

$V = \frac{4\pi r^3}{3} = \frac{4\pi(.875)^3}{3}$

$2.81\ ft^3$

**Find the surface area and volume of the following composite figures;**

A.




$5^2 + H^2 = 13^2$

$H = 12$

Cylinder

$B = 25\pi$

$H = 2$

$C = 10\pi$

Cone

$r = 5$

$\ell = 13$

$B = 25\pi$

$H = 12$

$Vol. = BH + \frac{BH}{3}$

$(25\pi)(2) + \frac{(25\pi)(12)}{3}$

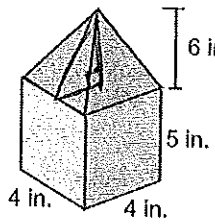
$50\pi + 100\pi = 150\pi \approx 471.2$

$SA = (2B + C) + (\pi r \ell) =$

$((10\pi)(2) + 25\pi) + \pi(5)(13) = 45\pi + 65\pi$

$110\pi \approx 345.6$

B.




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

$4 + 36 = \ell^2$

$40 = \ell^2$

$\ell = 6.32$

prism

$B = 16$

$P = 16$

$H = 5$

pyramid

$B = 16$

$P = 16$

$H = 6$

$\ell = 6.32$

$V = BH + \frac{BH}{3}$

$(16)(5) + \frac{(16)(6)}{3} = 112$

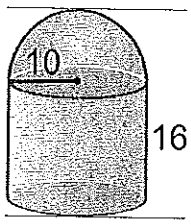
$SA = PH + 2B + \frac{1}{2}P\ell$

$(16)(5) + 16 + 96 + \frac{1}{2}(16)(6.32)$

$50.56$

$146.56$

C.




cylinder

$B = 100\pi$

$r = 10$

$H = 16$

$C = 20\pi$

hemisphere

$r = 10$

$V = BH$

$(100\pi)(16)$

$1600\pi = 5026.5 +$

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

$\frac{4188.8}{2} = 2094.4$

$SA = CH + 2B$

$(20\pi)(16) + 100\pi$

$320\pi + 100\pi$

$420\pi$

$+ \frac{1}{2}(4\pi r^2)$

$+ 2\pi(100)$

$+ 200\pi = 620\pi$

$7120.9$

11. The circumference of a standard baseball is about 9 in. About how many square in. of horsehide are required to cover 100 baseballs, to the nearest whole number? 1947.79

$C = 9 = 2\pi r$

$r = \frac{9}{(2\pi)} = 1.43$

$SA = 4\pi r^2$

$4\pi(1.43)^2$

$25.78$

$\times\ 100$

$2578.31 \approx 2578\ in^2$

12. The radius of Earth is approximately 4000 mi, and the radius of its core, which is a sphere of molten metals, is about 800 mi. What is the volume of Earth that lies outside the core to the nearest billion $mi^3$?


$r = 4000$

$V_{earth} = \frac{4\pi r^3}{3}$

$\frac{4\pi(4000)^3}{3}$

$V_{core} = \frac{4\pi r^3}{3}$

$\frac{4\pi(800)^3}{3}$

$8.465 \times 10^{10}$

13. Concrete can be purchased by the cubic yard. How much will it cost to pour a rectangular slab 18 feet by 18 feet by 4 inches for a patio if the concrete costs $41.00 per cubic yard?

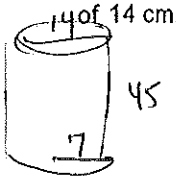

1 cu yd = 36" x 36" x 36"
46656 cu"

B = 216 · 216
46656
H = 4

B = (46656)(4)

$\frac{(186624)}{46656}(4)(41) = \$164$

14. Janine wants to paint just the lateral surface of a cylindrical pottery vase that has a height of 45 cm and a diameter of 14 cm. To the nearest whole number, find the number of square centimeters she will need to paint.




LA = CH
(14π)(45)
630π
1979

C = 14π
H = 45

15. Janine made a cylindrical vase in which the sum of the lateral area and area of one base was about 3000π square centimeters. The vase had a height of 35 centimeters. Find the radius of the vase.

LA = CH

LA + B = 3000π
CH + B = 3000π
C(35) + B = 3000π
$2\pi r(35) + \pi r^2 = 3000\pi$
$\frac{2\pi r(35)}{\pi} + \frac{\pi r^2}{\pi} = \frac{3000\pi}{\pi}$
$\Rightarrow 70r + r^2 = 3000$

$r^2 + 70r - 3000 = 0$
$(r - 30)(r + 100) = 0$
r = 30

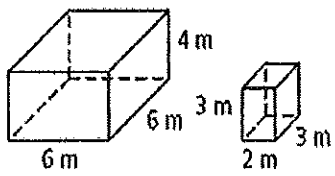
## Lesson 11-7

**Copy and complete the table for three similar solids.**

| | Similarity Ratio | Ratio of Surface Areas | Ratio of Volumes |
|---|---|---|---|
| 40. | 2 : 3 | 4 : 9 | 8 : 27 |
| 41. | 5 : 8 | 25 : 64 | 125 : 512 |
| 42. | 3 : 4 | 9 : 16 | 27 : 64 |

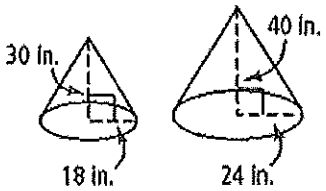
**Are the two figures similar? If so, give the scale factor.**

43.




6 : 2
6 : 3
3 : 4
NO

44.




30 : 40 ⇒ 3 : 4
18 : 24 ⇒ 3 : 4
yes

**The surface areas of two similar figures are given. The volume of the larger figure is given. Find the volume of the smaller figure.**

45. S.A. = 160 ft²
S.A. = 250 ft²
V = 600 ft³

| L | A | V |
|---|---|---|
| 4/5 | 160/250 | 64/125 |

$\frac{64}{125} = \frac{X}{600}$
307.2 ft³

46. S.A. = 121 cm²
S.A. = 196 cm²
V = 343 cm³

| L | A | V |
|---|---|---|
| 11/14 | 121/196 | 1331/2744 |

$\frac{1331}{2744} = \frac{X}{343}$
V = 166.375 cm³

47. S.A. = 4 yd²
S.A. = 4.5 yd²
V = 8 yd³

| L | A | V |
|---|---|---|
| 2/√4.5 | 4/4.5 | 8/9.546 |

$\frac{8}{9.546} = \frac{X}{8}$
6.7

13. Concrete can be purchased by the cubic yard. How much will it cost to pour a rectangular slab 18 feet by 18 feet by 4 inches for a patio if the concrete costs $41.00 per cubic yard?

**14.** Janine wants to paint just the lateral surface of a cylindrical pottery vase that has a height of 45 cm and a diameter of 14 cm. To the nearest whole number, find the number of square centimeters she will need to paint.

$LA = CH$

$(14\pi)(45)$

$630\pi$

1979

$C = 14\pi$

$H = 45$

**15.** Janine made a cylindrical vase in which the sum of the lateral area and area of one base was about $3000\pi$ square centimeters. The vase had a height of 35 centimeters. Find the radius of the vase.

$LA + B = 3000\pi$

$CH + B = 3000\pi$

$C(35) + B = 3000\pi$

$2\pi r(35) + \pi r^2 = 3000\pi$

$\frac{2\pi r(35) + \pi r^2 = 3000\pi}{\pi}$

$70r + r^2 = 3000$

$r^2 + 70r - 3000 = 0$

$(r - 30)(r + 100) = 0$

$r = 30$

16. The surface area of a right cone is $24\pi\ cm^2$, the slant height is *5 cm*. Find the radius.

$SA = \frac{1}{2}Cl + B$

$24\pi = \frac{1}{2}(2\pi r)(5) + \pi r^2$

$\frac{24\pi = 5\pi r + \pi r^2}{\pi}$

$r^2 + 5r - 24 = 0$

$(r - 3)(r + 8) = 0$

$r = 3$

17. The surface area of a cylinder is $120\pi\ ft^2$, the radius is *4 ft*. Find the height.

$SA = CH + 2B$

$120\pi = 2\pi(4)H + 2(\pi)(4^2)$

$\frac{120\pi = 8\pi H + 32\pi}{2\pi}$

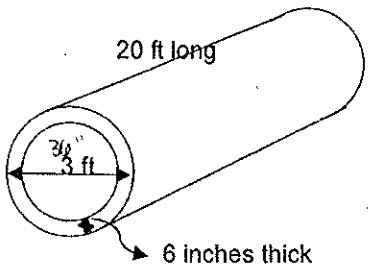
$60 = 4H + 16$

$-16 \quad -16$

$44 = 4H$

$H = 11$

18. There is a concrete water pipe that is a cylinder and runs underground. The pipe is 20 feet long and has a total diameter of 3 feet. If the concrete is 6 inches thick, then what is the diameter of the opening in the pipe? 2ft (24")




Find number of cubic feet of concrete used to make this pipe _____

Find the surface area of the pipe _____

lg. Cylinder

$r = 18"$

$C = 36\pi$

$B = 324\pi$

$H = 240"$

$V = (324\pi)(240)$

$77{,}760\pi$

Sm. Cylinder

$r = 12"$

$C = 24\pi$

$B = 144\pi$

$H = 240"$

$V = (144\pi)(240)$

$34{,}560\pi$

$77{,}760\pi - 34{,}560\pi = 43{,}200\pi\ in^3$

oops! wrong over there

$SA = 9288\pi$

subtract $288\pi$

$2(144\pi)$

$9000\pi$

$SA = CH + 2B$

$2\pi(18)(240) + 2(324\pi)$

$8640\pi + 648\pi$ $9288\pi$

$LA = CH$

$(24\pi)(240)$

$5760\pi$

$+ 9000\pi$

$14{,}760\pi\ ft^3$

(13) ~~1979~~ $cm^2$ (14) 1979 cm² (15) r = 30 (16) r = 3 (17) H = 11 (18) diam. of opening = 24 in (2ft) ; V of concrete = $43{,}200\pi \approx 135{,}631.68$

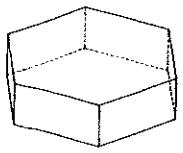
Geometry

Name ANSWERS ID: 2

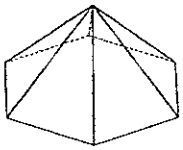
# Surface Area and Volume

Date _____ Period ____

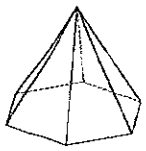
**Name each figure.**

1) 

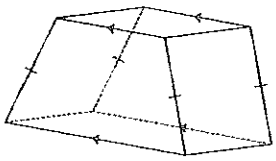
Hexagonal prism

2) 

Hexagonal pyramid

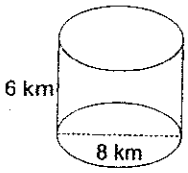
3) 

Hexagonal pyramid

4) 

trapezoidal prism

**Find the lateral area and surface area (= volume) of each figure. Round your answers to the nearest whole, if necessary.**

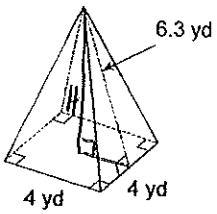
5) 


$r = 4$

$C = 8\pi$

$H = 6$

$B = 16\pi$

6) 


$P = 16$

$H = 5.97$

$\ell = 6.3$

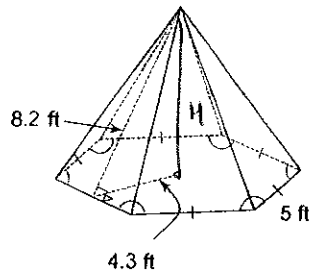
$B = 16$

$H^2 + 2^2 = 6.3^2$

$H^2 = 35.69$

$H = 5.97$

7) $H^2 + 4.3^2 = 8.2^2$



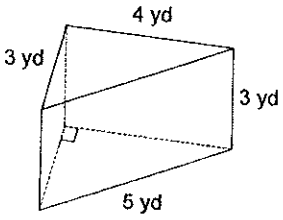

$P = 30$

$H = 6.98$

$\ell = 8.2$

$B = \frac{1}{2}(4.3)(30)$

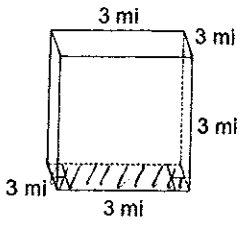
$64.5$

8) 


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

$P = 12$

$H = 3$

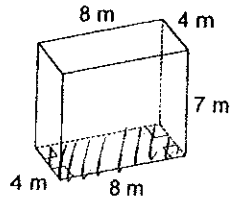
9) 


$B = 9$

$P = 12$

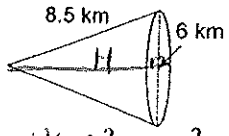
$H = 3$

10)




$B = 32$
$H = 7$
$P = 24$

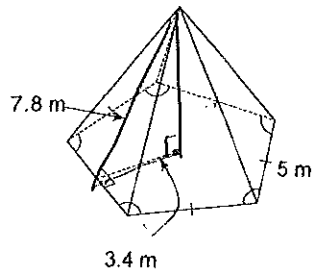
11)




$H^2 + 3^2 = 8.5^2$
$H = 7.95$

$C = 6\pi$
$H = 7.95$
$\ell = 8.5$
$B = 9\pi$

12)




$H^2 + 3.4^2 = 7.8^2$

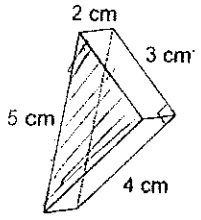
$\ell = 7.8$
$P = 25$
$B = \frac{1}{2}(3.4)(25)$
$42.5$
$H = 7.02$

Answers to Surface Area and Volume (ID: 2)

1) hexagonal prism 5) 151 km²; 251 km² 9) 36 mi²; 54 mi² 13) 24 cm²; 36 cm²
2) hexagonal pyramid 6) 50 yd²; 66 yd² 10) 168 m²; 232 m² 14) 140 cm²; 190 cm²
3) hexagonal pyramid 7) 123 ft²; 188 ft² 11) 80 km²; 108 km² 15) 180 ft²; 309 ft²
4) trapezoid 8) 36 yd²; 4... 12) 98 m²; 140 m² 16) 37.7 ft²; 43.98 ft²

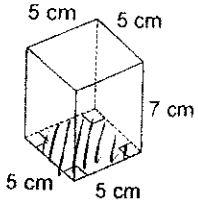
**Find the lateral area and surface area of each figure. Round your answers to the nearest hundredth, if necessary.**

13)



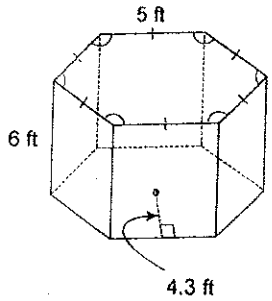

$P = 12$
$B = \frac{1}{2}(3)(4) = 6$
$H = 2$

14)



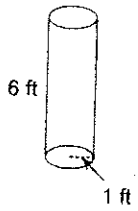

$P = 20$
$H = 7$
$B = 25$

15)




$P = 30$
$B = \frac{1}{2}(4.3)(30)$
$64.5$
$H = 6$

16)



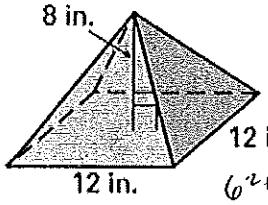

$C = 2\pi$
$H = 6$
$B = \pi$

Name_____ Period____ Date_____

**Geometry : Surface Area and Volume of Pyramids and Cones Practice**

**.. Find the surface area and volume of the figures below. MAKE your "LIST" for each!!! All pyramids are Regular.**

a.




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

$\ell=10$

$P=48$

$B=144$

$H=8$

$\ell=10$

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

$\frac{1}{2}(48)(10)+144$

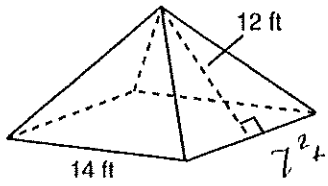
$240+144$

$384\ in^2$

$V=\frac{(144)(8)}{3}$

$V=384\ in^3$

b.




$7^2+H^2=12^2$

$P=56$

$B=196$

$H=9.75$

$\ell=12$

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

$\frac{1}{2}(56)(12)+196$

$336+196$

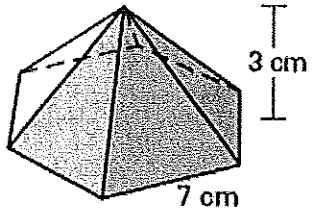
$532\ ft^2$

$V=\frac{BH}{3}$

$\frac{(196)(9.75)}{3}$

$637\ ft^3$

c.




$P=42$

$H=3$

$B=\frac{1}{2}aP=\frac{1}{2}(3.5\sqrt{3})(42)$

$=73.5\sqrt{3}$

$\approx 127.31$

$\ell=4.61$

$3.5^2+3^2=\ell^2$

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

$\frac{1}{2}(42)(4.61)+127.31$

$+42$

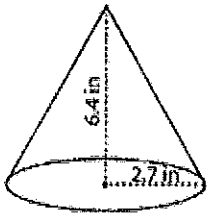
$+42$

$269.35$

$V=\frac{(127.31)(3)}{3}$

$V=127.31$

d.




$2.7^2+6.4^2=\ell^2$

$C=5.4\pi$

$H=6.4$

$B=7.29\pi$

$\ell=6.95$

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

$\frac{1}{2}(5.4\pi)(6.95)+7.29\pi$

$18.765\pi+7.29\pi$

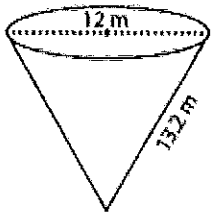
$26.055\pi \approx 81.85$

$V=\frac{BH}{3}=\frac{(7.29\pi)(6.4)}{3}$

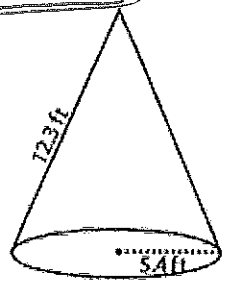
$15.552\pi$

$48.86\ m^3$

e.




f.




$r=5.4$

$C=10.8\pi$

$B=29.16\pi$

$H=11.05$

$\ell=12.3$

$5.4^2+H^2=12.3^2$

$151.29$

$H^2=122.13$

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

$66.42\pi+29.16$

$95.58\pi$

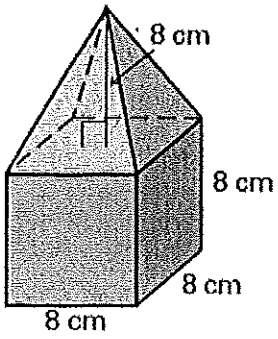
$300.27$

$V=$

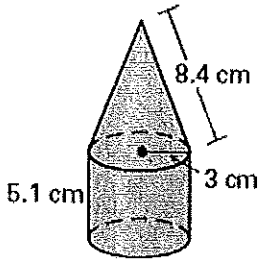
$107.41\pi$

$337.43$

7. Find the Surface Area and Volume for the following solid.




7. Find the surface area and volume of the solid below. Round your answer to the nearest hundredth.




8. The Volume of a regular pyramid is 96 cubic inches. The area of the base of the pyramid is 36 square units. What is the height of the pyramid?

9. A regular pyramid has a square base. If the sides of the square are 6 m and the height of the pyramid is 4m, find the slant height. Find the surface area.

12. The surface area of a right cone is $70\pi$ in2. If the radius is 5 in, find the slant height.

Geometry 22 CHAPTER 11 pre -TEST (no spheres) Name ANSWERS

*Please fill in the appropriate formulas:*

~ any right PRISM 1) SA = $PH + 2B$ 2) V= $BH$

~ any CYLINDER 3) SA = $CH + 2B$ 4) V= $BH$

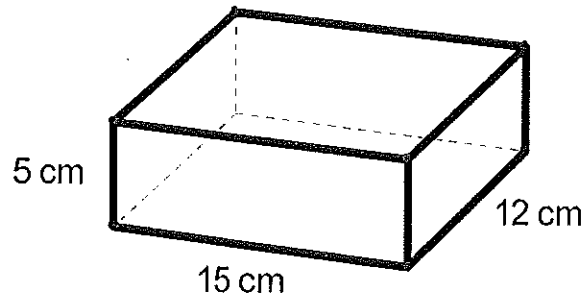
~ any PYRAMID 5) SA = $\frac{1}{2}pl + B$ 6) V= $\frac{BH}{3}$

~ any CONE 7) SA = $\frac{1}{2}Cl + B$ (or $\pi rl + \pi r^2$) 8) V= $\frac{BH}{3}$

For each figure, name the figure; write out the correct formula to use, then make the LIST...

9) This is a rectangular prism

SA = $PH + 2B$



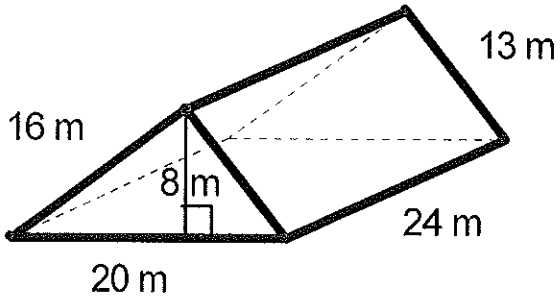

$B = (15)(12) = 180$

$H = 5$

$p = 54$

10) This is a triangular prism

V = $BH$



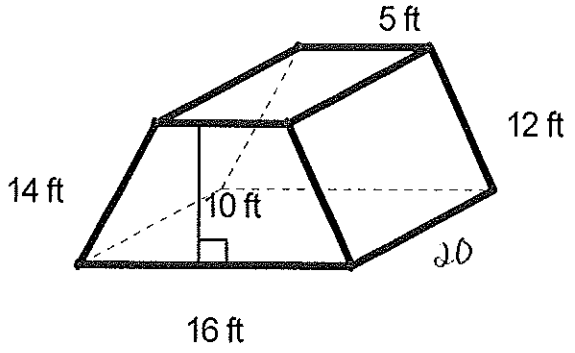

$B = \frac{1}{2}bh$

$\frac{1}{2}(20)(8) = 80$

$H = 24$

11) This is a trapezoidal prism

LA = PH




$P = 14+5+16+12 = 47$

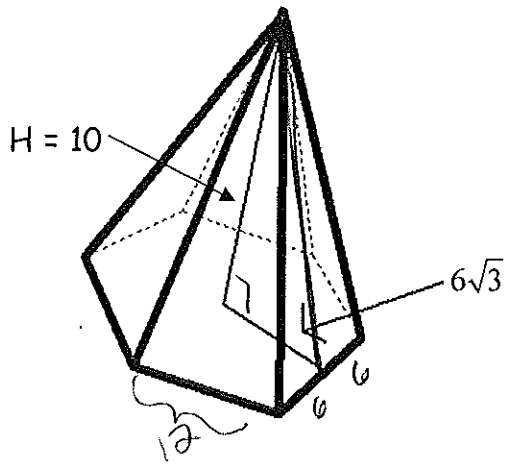
$H = 20$

$B = \frac{1}{2}(10)(16+5)$

$(105)$

12) This is a hexagonal pyramid

SA = $\frac{1}{2}Pl + B$




$(6\sqrt{3})^2 + 10^2 = l^2$

$108 + 100 = 208 = l^2$

$P = 72$

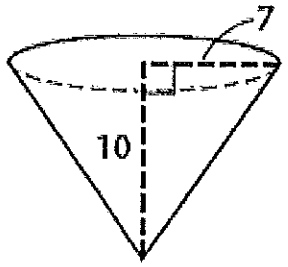
$l = 14.42$

$B = \frac{1}{2}ap$

$\frac{1}{2}(6\sqrt{3})$

13) This is a cone

LA = $\frac{1}{2}Cl$ or $\pi r l$




$7^2 + 10^2 = l^2$

$49 + 100 = l^2$

$l = \sqrt{149}$

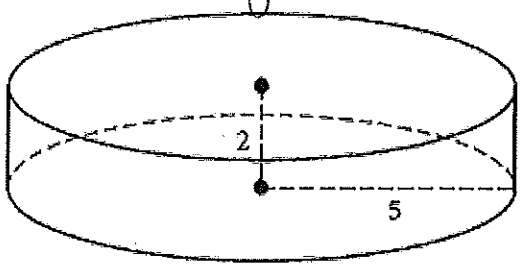
$C = 14\pi$

$l = 12.21$

$r = 7$

14) This is a cylinder

V = BH




$B = \pi r^2$

$25\pi$

$H = 2$

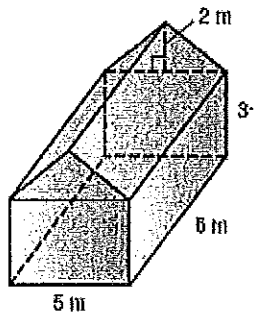
## Chapter 11 - Composite Space Figures – 3-dimensional figures that are combinations of two or more simpler figures.

***VOLUME** – to find volume of the composite figure, just find the volume of EACH part separately, then ***ADD*** the volumes together!! (sometimes you will need to subtract volume if there is a hole!)

****SURFACE AREA** – to find surface area of the composite figure, just find the surface area of EACH part separately, add them together, then consider whether you need to ***SUBTRACT*** out any faces that are NOT included in the surface!!!

**Make your "list" for each section of the solid FIRST!**

1.




Rect. Prism

$B = 5(6) = 30$

$H = 3$

$P = 22$

$V = BH = (30)(3) = 90$

$SA = PH + 2B$

$(22)(3) + 2(30)$

$66 + 60$

$126\ m^2$

$- 30$

$96$

Triangular Prism

$B = \frac{1}{2}(2)(5) = 5$

$H = 6$

$P = 11.4$

$V = BH = (5)(6) = 30$

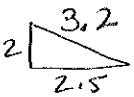
$SA = PH + 2B$

$(7.7)(6) + 2(5)$

$46.21 + 10 = 56.21$

$- 30$

$26.21$



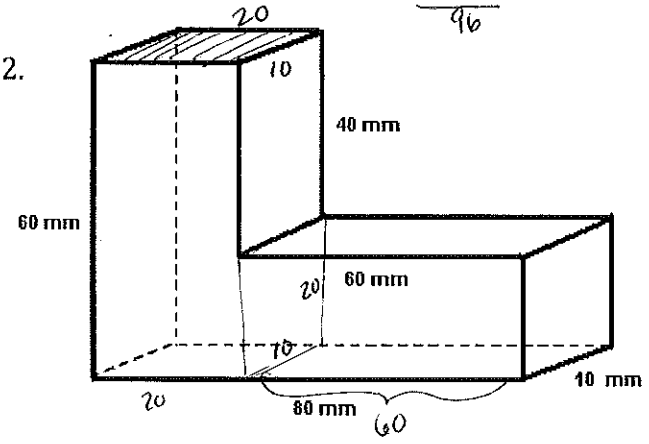

$V = 90 + 30$

$120\ m^3$

$SA = 96 + 26.21$

$122.21\ m^2$

2.




Tall Rect. prism

$B = (10)(20) = 200$

$H = 60$

$P = 60$

$V = (200)(60) = 12{,}000\ mm^3$

$SA = PH + 2B$

$(60)(60) + 2(200)$

$3600 + 400$

$4000$

$- 200$

$3800$

Long Rect. Prism

$B = 10(60) = 600$

$H = 20$

$P = 140$

$V = BH = (600)(20)$

$12000$

$SA = PH + 2B$

$(140)(20) + 2(600)$

$2800 + 1200$

$4000$

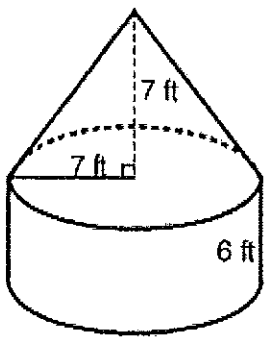
$- 200$

$3800$

$V = 24{,}000$

$SA = 7600$

3.




$l^2 = 7^2 + 7^2$

$l = 9.9$

cylinder

$C = 14\pi$

$H = 6$

$B = 49\pi$

$V = BH = 49\pi(6)$

$294\pi$

$SA = PH + 2B$

$14\pi(6) + 2(49\pi)$

$84\pi + 98\pi$

$182\pi - 49\pi = 133\pi$

cone

$C = 14\pi$

$H = 7$

$B = 49\pi$

$V = \frac{BH}{3} = \frac{(49\pi)(7)}{3} = \frac{343\pi}{3} = 114.3\pi$

$SA = \frac{1}{2}Cl + B$

$\frac{1}{2}(14\pi)(9.9) = 69.3\pi$

$V = 294\pi + 114.3\pi$

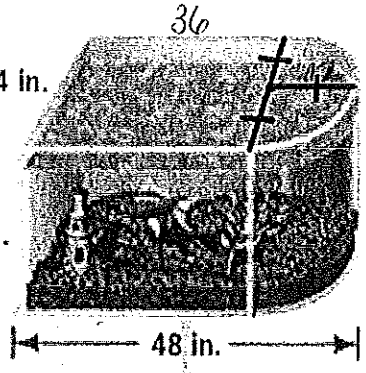
$408.3\pi$

$\approx 1282.7\ ft^3$

$SA = 202.3\pi$

$\approx 635.54\ ft^2$

4. What are the approximate surface area and volume of this aquarium? Round to the nearest whole number.




Rectangular prism

$V = (864)(24)$

20,736

$B = 864$
$H = 24$
$P = 120$

Cylinder ($\frac{1}{2}$)

$B = 144\pi / 2 = 72\pi$
$C = 24\pi = 12\pi$
$H = 24$

$V = 72\pi(24)$
$1728\pi$
$\approx 5428.67$

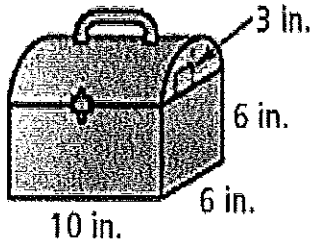
$V = 26,164.67 \text{ in}^3$

$SA = PH + 2B$
$(120)(24) + 2(864)$
$2880 + 1728$
$4608$
$-\ 576$ (subtract $24 \times 24$ square)
$4032$

$SA = \frac{CH + 2B}{2}$
$24\pi(24) + 2(144\pi)$
$576\pi + 288\pi$
$864\pi / 2$ (half cylinder) $= 432\pi \approx 1357.17$

$SA = 5389.17 \text{ in}^2$

5. What are the approximate surface area and volume of this lunch box? Round to the nearest whole number.




Rect. prism

$B = 60$
$H = 6$
$P = 32$

$V = 60(6) = 360$

$SA = PH + B$ (only 1 base showing)
$(32)(6) + 60$
$192 + 60$
$252$

$\frac{1}{2}$ cylinder

$C = 6\pi$
$H = 10$
$B = 9\pi$

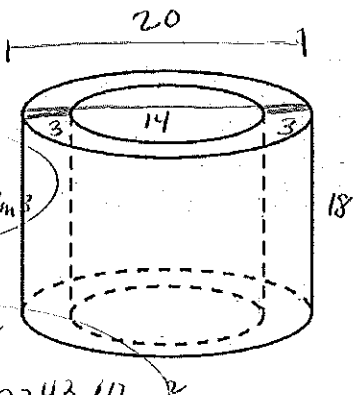
$V = BH = 90\pi$ (full cylinder)
$\frac{1}{2}$ cylinder $= \frac{90\pi}{2} = 45\pi \approx 141.37$

$V = 501.37 \text{ in}^3$

$SA = CH + 2B$
$(6\pi)(10) + 2(9\pi)$
$60\pi + 18\pi$
$78\pi$ (full) $\div 2 = \frac{1}{2}$ cylinder $39\pi \approx 122.52$

$SA = 374.52 \text{ in}^2$

6. A lab technician made a 14 cm diameter hole through the middle of a cylinder that has a diameter of 20 cm and a height of 18 cm. What are the approximate surface area and volume of the finished cylinder? Round to the nearest whole number.




lg cylinder

$C = 20\pi$
$H = 18$
$B = 100\pi$

$V = 1800\pi \approx 5654.87$

sm. cylinder hole

$C = 14\pi$
$H = 18$
$B = 49\pi$

$V = (49\pi)(18)$
$882\pi = 2770.88$

$V = 2883.99 \text{ cm}^3$

$SA = CH + 2B$
$20\pi(18) + 2(100\pi)$
$360\pi + 200\pi$
$560\pi - 2(49\pi)$
$462\pi \approx 1451.42$

$LA = CH$
$(14\pi)(18)$
$252\pi$

$SA = 714\pi$
$\approx 2243.10 \text{ cm}^2$

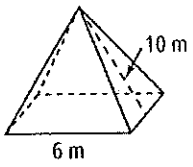
Name ANSWERS Period ____ Date _____

**Geometry: 11.3, 11.5 and 11.6**

Be sure to **SHOW ALL WORK** including your list!

**1. Find the lateral area of each pyramid to the nearest whole number.**

a.




$p = 24$

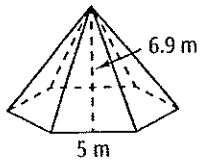
$\ell = 10$

$LA = \frac{1}{2}p\ell$

$\frac{1}{2}(24)(10)$

$120\ m^2$

b.




$p = 30$

$\ell = 6.9$

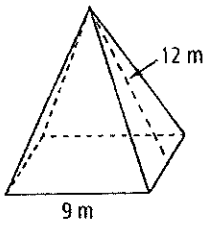
$LA = \frac{1}{2}p\ell$

$\frac{1}{2}(30)(6.9)$

$103.5\ m^2$

**2. Find the surface area of each pyramid to the nearest whole number.**

a.




$p = 36$

$\ell = 12$

$B = 81$

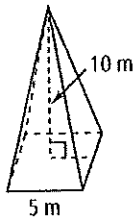
$SA = \frac{1}{2}p\ell + B$

$\frac{1}{2}(36)(12) + 81$

$216 + 81$

$297\ m^2$

b.




$p = 20$

$\ell = 10.31$

$B = 25$

$2.5^2 + 10^2 = \ell^2$

$6.25 + 100 = \ell^2$

$\ell = 10.31$

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

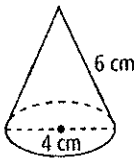
$(.5)(20)(10.31) + 25$

$103.1 + 25$

$128.1 \approx 128\ m^2$

**3. Find the lateral area of each cone to the nearest whole number.**

a.




$C = 4\pi$

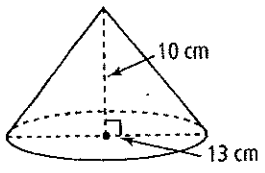
$\ell = 6$

$LA = \frac{1}{2}C\ell$

$(.5)(4\pi)(6)$

$12\pi \approx 38 cm^2$

b.




$C = 13\pi$

$\ell = 11.93$

$6.5^2 + 10^2 = \ell^2$

$42.25 + 100 = \ell^2$

$\ell = 11.93$

$LA = \frac{1}{2}C\ell$

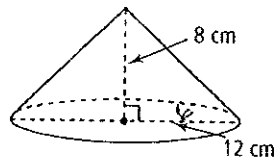
$\frac{1}{2}(13\pi)(11.93)$

$77.52\pi$

$\approx 244\ cm^2$

**4. Find the surface area of each cone in terms of π.**

a.




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

$\ell=10$

$C=12\pi$

$\ell=10$

$B=36\pi$

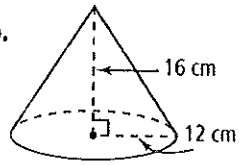
$SA=\frac{1}{2}C\ell+B$

$\frac{1}{2}(12\pi)(10)+36\pi$

$60\pi+36\pi$

$96\pi\ cm^2$

b.




$C=24\pi$

$\ell=20$

$B=144\pi$

$12^2+16^2=\ell^2$

$\ell=20$

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

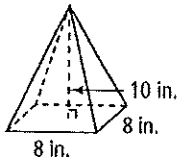
$\frac{1}{2}(24\pi)(20)+144\pi$

$240\pi+144\pi$

$384\pi\ cm^2$

**5. Find the volume of each square pyramid. Round to the nearest tenth if necessary.**

a.



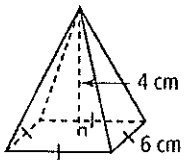

$B=64$

$V=\frac{BH}{3}$

$H=10$

$V=\frac{(64)(10)}{3}=\frac{640}{3}=213.\overline{3}\ in^3$

b.




$B=36$

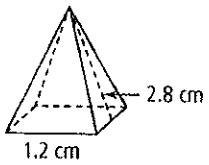
$V=\frac{BH}{3}$

$H=4$

$\frac{(36)(4)}{3}=\frac{144}{3}=48\ cm^3$

**6. Find the volume of each square pyramid, given its slant height. Round to the nearest tenth.**

a.




$V=\frac{BH}{3}$

$B=1.44$

$H=2.73$

$.6^2+H^2=2.8^2$

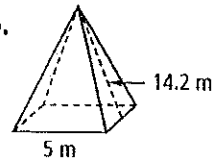
$H^2=7.48$

$H=2.73$

$V=\frac{(1.44)(2.73)}{3}$

$V=1.31\approx 1.3\ cm^3$

b.




$B=25$

$H=13.98$

$2.5^2+H^2=14.2^2$

$H^2=195.39$

$H=13.98$

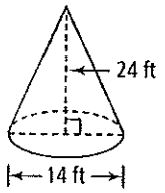
$V=\frac{BH}{3}$

$\frac{(25)(13.98)}{3}$

$V=116.48\ m^3$

**8. Find the volume of each cone in terms of $\pi$ and also rounded as indicated.**

a. nearest cubic foot




$B = 49\pi$

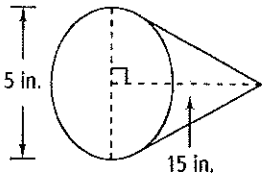
$H = 24$

$V = \frac{BH}{3} = \frac{(49\pi)(24)}{3}$

$392\pi \text{ ft}^3 \approx 1231.5$

$1231 \text{ ft}^3$

b. nearest cubic inch




$B = 6.25\pi$

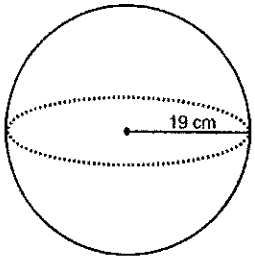
$H = 15$

$V = \frac{BH}{3} = \frac{(6.25\pi)(15)}{3}$

$31.25\pi \text{ in}^3 \approx 98 \text{ in}^3$

**9. Find the surface area and volume. Write answer in terms of pi AND to the nearest hundredth.**

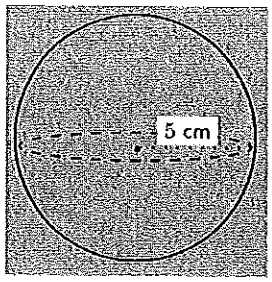
a.




$SA =$

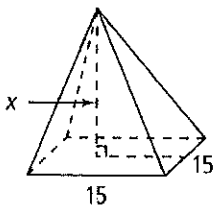
$V =$

b.




**17. Find the value of $x$ in each figure. Leave answers in simplest radical form. The diagrams are not to scale.**

a.




Volume = 1500

$B = 225$

$H = x$

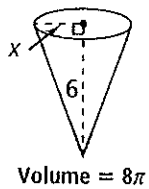
$V = \frac{BH}{3}$

$1500 = \frac{225x}{3}$

$1500 = 75x$

$x = 20$

b.




Volume = $8\pi$

$V = \frac{BH}{3}$

$B = x^2\pi$

$H = 6$

$8\pi = \frac{6x^2\pi}{3}$ (3)

$\frac{24\pi}{6} = \frac{6x^2\pi}{6}$

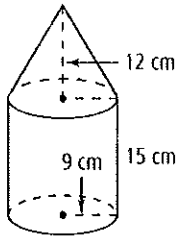
$\frac{4\pi}{\pi} = \frac{x^2\pi}{\pi}$

$x^2 = 4$

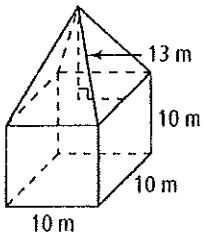
$x = 2$

**18. Find the exact volume of each figure, then round to the nearest whole number.**

**a.**

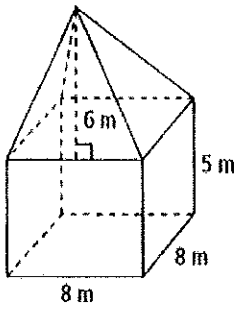



**b.**

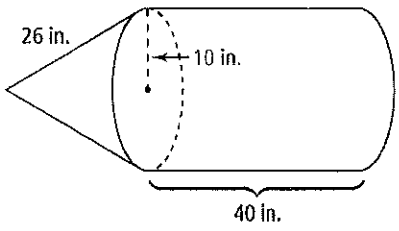



**19. Find the exact surface area of each figure, then to the nearest whole number in part b.**

**a.**




**b.**




CH + 2B