

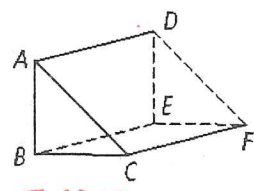
# GEO 21 ☺ Extra Practice

## Chapter 11

### Lesson 11-1

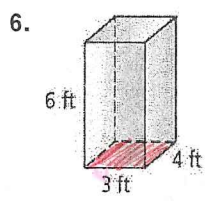
- Look at the polyhedron at the right.
  - How many vertices are there? List them.
  - How many edges are there? List them.
  - How many faces are there? List them.

6 pts. A, B, C, D, E, F  
 9  $\overline{AB}, \overline{BC}, \overline{CA}, \overline{AD}, \overline{CF}, \overline{BE}$   
 $\overline{DE}, \overline{DF}, \overline{EF}$   
 5  $\triangle ABC, \triangle DEF, \square ADFC, \square FCBE, \square ADEB$

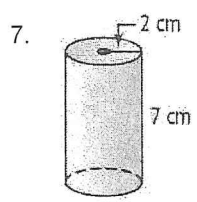


### Lessons 11-2 and 11-3

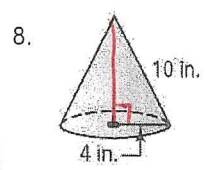
Find the (a) lateral area and (b) surface area and (c) volume of each figure. Leave your answers in terms of  $\pi$  or in simplest radical form.



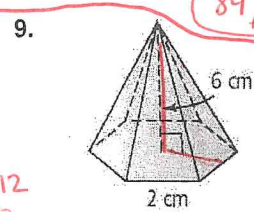
$B = (3)(4) = 12$   
 $P = 3 + 4 + 3 + 4 = 14$   
 $H = 6$   
 $SA = PH + 2B$   
 $(14)(6) + 2(12)$   
 $84 + 24 = 108$   $\overset{pt^2}{=} SA$   
 $84 = LA$   $\overset{ft^2}{=} SA$



$B = \pi(2)^2 = 4\pi$   
 $C = 4\pi$   
 $H = 7$   
 $V = BH$   
 $V = (4\pi)(7)$   
 $28\pi$   
 $SA = CH + 2B$   
 $(4\pi)(7) + 2(4\pi)$   
 $28\pi + 8\pi$   
 $36\pi \text{ cm}^2$   
 $LA = 28\pi$



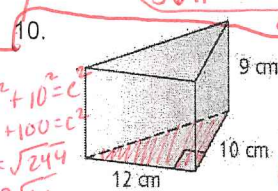
$B = \pi(4)^2$   
 $16\pi$   
 $r = 4$   
 $l = 10$   
 $H = 2\sqrt{21}$   
 $4^2 + H^2 = 10^2$   
 $16 + H^2 = 100$   
 $H^2 = 84$   
 $H = 2\sqrt{21}$   
 $SA = \pi r l + \pi r^2$   
 $\pi(4)(10) + \pi(4^2)$   
 $40\pi + 16\pi$   
 $SA = 56\pi \text{ in}^2$   
 $LA = 40\pi \text{ in}^2$   
 $V = \frac{BH}{3} = \frac{(16\pi)(2\sqrt{21})}{3}$   
 $\frac{32\pi\sqrt{21}}{3} \text{ in}^3$



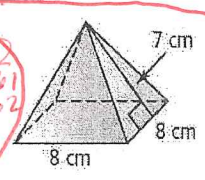
$P = 12$   
 $B = \frac{1}{2}ap$   
 $\frac{1}{2}(\sqrt{3})(12)$   
 $6\sqrt{3}$   
 $H = 6$   
 $l \Rightarrow l^2 = 6^2 + (6\sqrt{3})^2$   
 $l^2 = 36 + (36 \cdot 3)$   
 $36 + 108$   
 $l^2 = 144$   
 $l = 12$

$SA = \frac{1}{2}pl + B$   
 $\frac{1}{2}(12)(12) + 6\sqrt{3}$   
 $SA = 72 + 6\sqrt{3} \text{ cm}^2$   
 $LA = 72 \text{ cm}^2$

$V = \frac{BH}{3} = \frac{(6\sqrt{3})(6)}{3} = 12\sqrt{3} \text{ cm}^3$   
 $V = BH$   
 $(60)(9) = 540 \text{ cm}^3$



$12^2 + 10^2 = c^2$   
 $144 + 100 = c^2$   
 $c = \sqrt{244}$   
 $2\sqrt{61}$   
 $P = 22 + 2\sqrt{61}$   
 $15.62$   
 $B = 60$   
 $H = 9$   
 $SA = PH + 2B$   
 $(37.62)(9) + 2(60)$   
 $338.58 + 120$   
 $SA = 458.58 \text{ cm}^2$   
 $LA = 338.58$



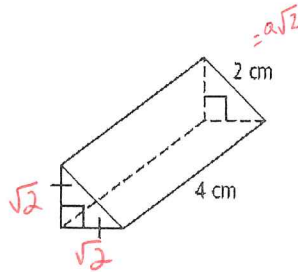
$B = 64$   
 $P = 32$   
 $l = 7$   
 $H = 5.74$   
 $4^2 + H^2 = 7^2$   
 $16 + H^2 = 49$   
 $H^2 = 33$   
 $H = 5.74$   
 $SA = \frac{1}{2}pl + B$   
 $\frac{1}{2}(32)(7) + 64$   
 $112 + 64$   
 $SA = 176 \text{ cm}^2$   
 $LA = 112 \text{ cm}^2$   
 $V = \frac{BH}{3} = \frac{(64)(5.74)}{3}$   
 $122.45 \text{ cm}^3$

**Extra Practice** (continued)

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

Chapter 11

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.



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

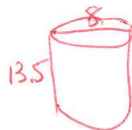
$$SA = pH + 2B = 19.31 + 2(1) = 21.31 \approx 21.3 \text{ cm}^2$$

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

$$H = 4$$

$$p = \sqrt{2} + \sqrt{2} + 2 = 2\sqrt{2} + 2 = 4.83$$

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.



$$LA = \pi d h = (8\pi)(13.5) = 108\pi$$

$$C = 8\pi$$

$$B = 16\pi$$

$$H = 13.5$$

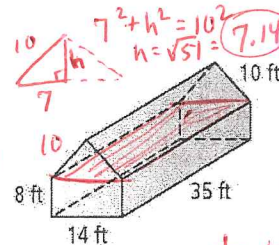
$$V = BH = (16\pi)(13.5) = 216\pi \approx 678.58 \text{ cm}^3 \text{ of salt}$$

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

**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

$$V = BH = (49)(8) = 392 \text{ ft}^3$$

+ triang. prism

$$V = (49.99)(35) = 1749.65$$

$$B = \frac{1}{2}bh = \frac{1}{2}(14)(7) = 49$$

$$H = 8$$

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



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.

$$r = 3.75$$

$$V = \pi r^2 h = \pi(3.75)^2(11) = 485.97 \approx 486.0$$

$$B = \pi(3.75)^2 = 44.18$$

$$H = 11$$

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.



$$d = 2.5$$

$$r = 1.25$$

$$H = 3.5$$

$$B = 1.5625\pi = 4.91$$

$$V = \frac{1}{3}BH = \frac{(4.91)(3.5)}{3} = 5.73 \text{ in}^3$$

**Lesson 11-6**

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

30.  $r = 5$  cm

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

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

31.  $r = 3$  ft

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

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

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

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

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

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

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

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

34.  $r = 0.5$  in.

$$V = \frac{4}{3}\pi(0.5)^3 = \frac{0.5\pi}{3} \approx 0.52$$

$$SA = 4\pi(0.5)^2 = \pi \approx 3$$

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

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

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

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  $r = \frac{7}{2}$

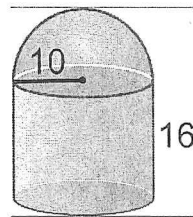
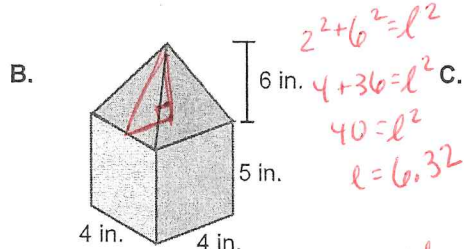
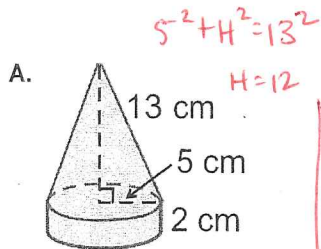
39. A spherical beach ball has a diameter of 1.75 ft when it is full of air. What is the surface area of the beach ball, and how many cubic feet of air does it contain? Round to the nearest hundredth.

$r = .875$

$SA = 4\pi r^2$   
 $4\pi (.875)^2$   
 $9.62 ft^2$

$V = \frac{4\pi r^3}{3} = \frac{4\pi (.875)^3}{3}$   
 $2.81 ft^3$

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



Cylinder  
 $B = 25\pi$   
 $H = 2$   
 $C = 10\pi$   
 $Vol. = BH + \frac{BH}{3}$   
 $(25\pi)(2) + \frac{25\pi(12)}{3}$   
 $50\pi + 100\pi = 150\pi \approx 471.2$

prism  
 $B = 16$   
 $P = 16$   
 $H = 5$   
 $V = BH + \frac{BH}{3}$   
 $(16)(5) + \frac{(16)(6)}{3} = 80 + 32 = 112$

Pyramid  
 $B = 16$   
 $p = 16$   
 $H = 6$   
 $l = 6.32$   
 $SA = pH + \frac{1}{2}pl$   
 $(16)(5) + \frac{1}{2}(16)(6.32) = 80 + 50.56 = 130.56$

cylinder  
 $B = 100\pi$   
 $r = 10$   
 $H = 16$   
 $C = 20\pi$   
 $V = BH + \frac{4\pi r^3}{3} = \frac{4\pi(10)^3}{3}$   
 $1600\pi = 5026.5 + 4188.8 = 9215.3$

hemisphere  
 $r = 10$   
 $V = \frac{4\pi r^3}{3} = \frac{4\pi(10)^3}{3}$   
 $SA = CH + \frac{1}{2}(4\pi r^2) + \frac{1}{2}(2\pi(100)) + 200\pi = 620\pi + 1947.79$

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?

$C = 9 = 2\pi r$   
 $r = \frac{9}{2\pi} = 1.43$

$SA = 4\pi r^2$   
 $4\pi(1.43)^2$   
 $25.78$   
 $\times 100$   
 $2578.31 \approx 2578 in^2$

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  $mi^3$ ?

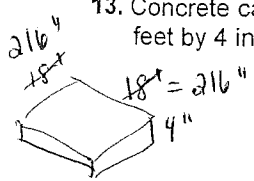
$r = 4000$

$V_{earth} = \frac{4\pi r^3}{3}$   
 $\frac{4\pi(4000)^3}{3}$

$V_{core} = \frac{4\pi r^3}{3}$   
 $\frac{4\pi(800)^3}{3}$

$8.465 \times 10^{10}$

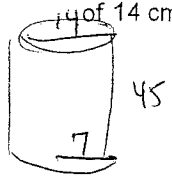




13. Concrete can be purchased by the cubic yard. How much will it cost to pour a rectangular slab 18 feet by 18 feet by 4 inches for a patio if the concrete costs \$41.00 per cubic yard?

$1 \text{ cu yd} = 36'' \times 36'' \times 36'' = 46656 \text{ cu}''$   
 $B = 216 \cdot 216 = 46656$   
 $B = (46656)(4)$   
 $H = 4$   
 $\frac{(186624)}{46656} = (4)(41) = \$164$

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.



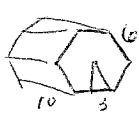
$LA = CH$   
 $C = 14\pi$   
 $(14\pi)(45)$   
 $630\pi$   
 $1979$

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.

$LA = CH$   
 $LA + B = 3000\pi$   
 $CH + B = 3000\pi$   
 $C(35) + B = 3000\pi$   
 $2\pi r(35) + \pi r^2 = 3000\pi \Rightarrow 70r + r^2 = 3000$   
 $r^2 + 70r - 3000 = 0$   
 $(r - 30)(r + 100) = 0$   
 $r = 30$

~~Lesson 2.2.3~~

10) A right prism has a hexagonal base. If each side of the hexagon is 6 cm, and the height of the prism is 10 cm, find the surface area and volume of the figure.



$a = 3\sqrt{3}$   
 $B = \frac{1}{2}(3\sqrt{3})(36) = 54\sqrt{3}$   
 $P = 36$   
 $H = 10$   
 $SA = PH + 2B$   
 $(36)(10) + 2(54\sqrt{3})$   
 $360 + 108\sqrt{3}$   
 $\approx 547.06 \text{ cm}^2$   
 $V = BH$   
 $(54\sqrt{3})(10)$   
 $540\sqrt{3}$   
 $935.31 \text{ cm}^3$

11) A cylinder has a surface area of  $56\pi$  and a height of 3. Find the radius.

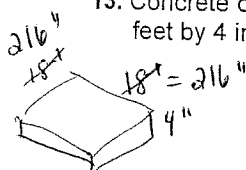
$SA = CH + 2B$   
 $SA = 2\pi rH + 2\pi r^2$   
 $56\pi = 2\pi r(3) + 2\pi r^2$

$28 = 3r + r^2$   
 $0 = r^2 + 3r - 28$   
 $(r - 4)(r + 7)$

$72\pi = \pi r(1) + \pi r^2$   
 $72 = r + r^2$   
 $0 = r^2 + r - 72$   
 $(r + 9)(r - 8) = 0$   
 $r = 8$

12) A cone has a surface area of  $72\pi$  and a slant height of 1. Find the radius.

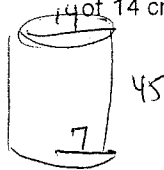
$SA = \frac{1}{2}Cl + B \Rightarrow \pi r l + \pi r^2$



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?  $1 \text{ cu yd} = 36'' \times 36'' \times 36''$

~~18~~  $B = 216 \cdot 216$   $B = (46656)(4)$   $46656 \text{ cu''}$   
 $H = 4$   $\frac{(186624)(4)}{46656} = (4)(41) = \$164$

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.

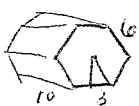


$LA = CH$   $C = 14\pi$   
 $(14\pi)(45)$   $H = 45$   
 $630\pi$   
 $1979$

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.

$LA = CH$   
~~LA + B = 3000\pi~~  $CH + B = 3000\pi$   $r^2 + 70r - 3000 = 0$   
 $C(35) + B = 3000\pi$   $(r-30)(r+100) = 0$   
~~Lesson 7.2.2~~  $2\pi r(35) + \pi r^2 = 3000\pi \Rightarrow 70r + r^2 = 3000$   $r = 30$

10) . A right prism has a hexagonal base. If each side of the hexagon is 6 cm, and the height of the prism is 10 cm, find the surface area and volume of the figure.



$a = 3\sqrt{3}$   $B = \frac{1}{2}(3\sqrt{3})(36) = 54\sqrt{3}$   $SA = pH + 2B$   $V = Bh$   
 $p = 36$   $H = 10$   $(36)(10) + 2(54\sqrt{3})$   $(54\sqrt{3})(10)$   
 $360 + 108\sqrt{3}$   $540\sqrt{3}$   
 $\approx 547.06 \text{ cm}^2$   $935.31 \text{ cm}^3$

11) A cylinder has a surface area of  $56\pi$  and a height of 3. Find the radius.

$SA = CH + 2B$   $28 = 3r + r^2$   $r = 4$   
 $SA = 2\pi rH + 2\pi r^2$   $0 = r^2 + 3r - 28$   $(r-4)(r+7)$   
 $56\pi = 2\pi r(3) + 2\pi r^2$   $72\pi = \pi r(1) + \pi r^2$   $r = 8$

12) . A cone has a surface area of  $72\pi$  and a slant height of 1. Find the radius.

$SA = \frac{1}{2}Cl + B \Rightarrow \pi r l + \pi r^2$   $72 = r + r^2$   
 $0 = r^2 + r - 72$   $(r+9)(r-8) = 0$