Chapter 11

Chapter Review

Vocabulary Review

altitude (pp. 608, 610, 617, 619)
base(s) (pp. 608, 610, 617, 619)
center of a sphere (p. 638)
circumference of a sphere (p. 638)
composite space figure (p. 627)
cone (p. 619)
cross section (p. 600)
cylinder (p. 610)
diameter of a sphere (p. 638)
edge (p. 598)
face (p. 598)
great circle (p. 638)
height (pp. 608, 610, 617, 619)
hemisphere (p. 638)
lateral area (pp. 608, 610, 617, 619)
lateral faces (pp. 608, 617)
oblique cylinder (p. 610)
oblique prism (p. 608)
polyhedron (p. 598)
prism (p. 608)
pyramid (p. 617)
radius of a sphere (p. 638)
regular pyramid (p. 617)
right cone (p. 619)
right cylinder (p. 610)
right prism (p. 608)
similar solids (p. 646)
similarity ratio (p. 646)
slant height (p. 617, 619)
sphere (p. 638)
surface area (pp. 608, 610, 618, 619)
vertex (pp. 598, 617, 619)
volume (p. 624)

Choose the correct term to complete each sentence.

1. A set of points in space equidistant from a given point is called a (*circle, sphere*). sphere
2. The (*height, altitude*) of a cylinder is a segment that joins the bases and is perpendicular to each base. altitude
3. A (*pyramid, prism*) is a polyhedron in which one face can be any polygon and the lateral faces are triangles that meet at a common vertex. pyramid
4. If you slice a prism with a plane, the intersection of the prism and the plane is a (*lateral area, cross section*) of the prism. cross section
5. In a(n) (*right, oblique*) prism, the lateral faces are rectangles and a lateral edge is an altitude. right

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Lesson 11-1

(G.6)(A) To describe and draw the intersection of a given plane with various three-dimensional geometric figures

(G.6)(B) To use nets to represent three-dimensional geometric figures

(G.9)(D) To analyze the characteristics of polyhedra based on concrete models

A **polyhedron** is a three-dimensional figure whose surfaces are polygons. The polygons are **faces** of the polyhedron. An **edge** is a segment that is the intersection of two faces. A **vertex** is a point where three or more edges intersect. A **net** is a two-dimensional pattern that folds to form a three-dimensional figure.

Draw a net for each three-dimensional figure. 6–8. Nets may vary. Samples are given. See margin.

6. 

7. 

8. 

The number of faces (F), vertices (V), and edges (E) of a polyhedron are related by Euler's Formula $F + V = E + 2$.

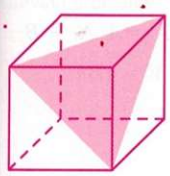
Use Euler's Formula to find the missing number.

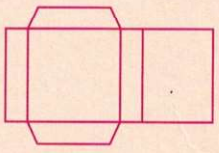
9. $F = 5, V = 5, E = \blacksquare$ 8

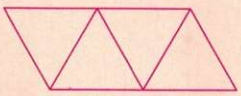
10. $F = 6, V = \blacksquare, E = 12$ 8

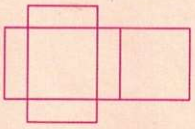
A **cross section** is the intersection of a solid and a plane.

11. Sketch a cube with an equilateral triangle cross section. See left.

11. 

6. 

7. 

8. 

TEKS ★ TAKS Resc

Student Edition
Extra Skills, Word Problen Practice, Ch. 11, p. 736
English/Spanish Glossary,
Properties and Formulas,
Table of Symbols, p. 763

TAKS Tune-Up Kit
- TAKS Daily Review Transparencies
- TAKS Review and Prepa Workbook
- TAKS Strategies with Transparencies
- Texas Progress Monitori
- Texas ExamView CD-RO
- Mindpoint Quiz Show

Differentiated Instruction
Vocabulary and Study Skil worksheet 11F
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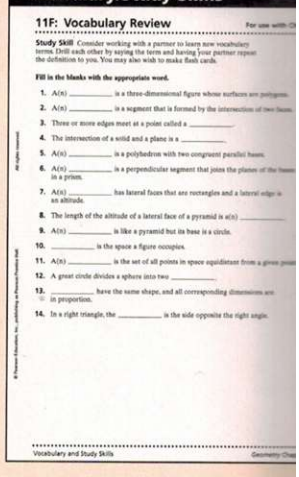


Lessons 11-2 and 11-4

(G.4)(A) To select an appropriate representation in order to solve problems.

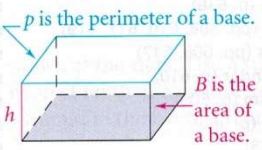
(G.6)(B) To use nets to represent three-dimensional geometric figures

(G.8)(D) To find surface areas and volumes of prisms and cylinders, and composites of these figures in problem situations

(G.9)(D) To analyze the characteristics of polyhedra and other three-dimensional figures based on explorations and concrete models

The **lateral area** of a **right prism** is the product of the perimeter of the base and t height. The **lateral area** of a **right cylinder** is the product of the circumference of the base and the height of the cylinder. The **surface area** of each solid is the sum the lateral area and the areas of the bases.

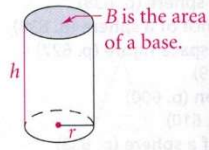
The **volume** of a space figure is the space that the figure occupies. Volume is measured in cubic units. The **volume** of a **prism** and the **volume** of a **cylinder** are the product of the area of a base and the height of the solid.



L.A. (prism) $= ph$

S.A. $=$ L.A. $+ 2B$

$V = Bh$



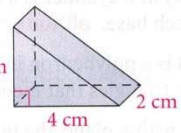
L.A. (cylinder) $= 2\pi rh$ or πdh

S.A. $=$ L.A. $+ 2B$

$V = Bh$

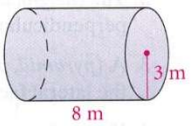
Find the surface area and volume of each figure. Leave your answers in terms of π.

12.



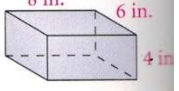
36 cm^2; 12 cm^3

13.



66π m^2; 72π m^3

14.



208 in.^{2}; 192 in.^{3}

Lessons 11-3 and 11-5

(G.4)(A) To select an appropriate representation in order to solve problems.

(G.6)(B) To use nets to represent three-dimensional geometric figures

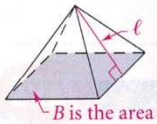
(G.8)(D) To find surface areas and volumes of pyramids and cones, and composites of these figures in problem situations.

(G.9)(D) To analyze the characteristics of polyhedra and other three-dimensional figures based on explorations and concrete models

The **lateral area** of a **regular pyramid** is half the product of the perimeter of the base and the slant height.

The **surface area** of a pyramid is the sum of the lateral area and the area of the base.

The **volume** of a pyramid is one third the product of the area of the base and the height of the solid.



L.A. (pyramid) $= \frac{1}{2}p\ell$

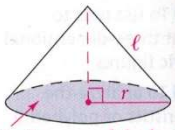
S.A. $=$ L.A. $+ B$

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

The **lateral area** of a **right cone** is half the product of the circumference of the base and the slant height.

The **surface area** of a cone is the sum of the lateral area and the area of the base.

The **volume** of a cone is one third the product of the area of the base and the height of the solid.



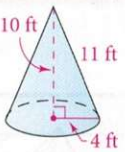
L.A. (cone) $= \pi r\ell$

S.A. $=$ L.A. $+ B$

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

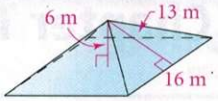
Find the surface area and volume of each figure. Leave your answers in terms of π.

15.



60π ft^2; $\frac{160}{3}\pi$ ft^3

16.



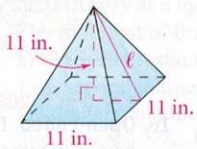
square pyramid

672 m^2; 512 m^3

17.

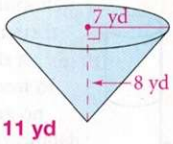
16π in.^{2}; $\frac{16\sqrt{2}}{3}\pi$ in.^{3}

18.



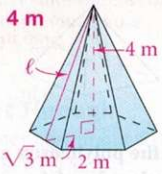
12 in.

19.



11 yd

20.



Find each formula as stated.

21. the base area of a prism in terms of the surface area and lateral area

$B = \frac{\text{S.A.} - \text{L.A.}}{2}$

22. the radius of a cylinder in terms of the surface area and height (*Hint:* Use the quadratic formula.)

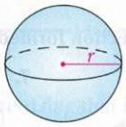
$r = -\frac{1}{2}h + \sqrt{\frac{1}{4}h^2 + \frac{\text{S.A.}}{2\pi}}$

Lesson 11-6

(G.6)(A) To describe and draw the intersection of a given plane with a sphere

(G.8)(D) To find surface areas and volumes of spheres, and composite figures

The **surface area of a sphere** is four times the product of π and the square of the radius of the sphere. The **volume of a sphere** is $\frac{4}{3}$ the product of π and the cube of the radius of the sphere.



Find the surface area and volume of a sphere with the given radius or diameter. Round answers to the nearest tenth.

23. $r = 5$ in.
314.2 in.^{2}; 523.6 in.^{3}

24. $d = 7$ cm
153.9 cm^2; 179.6 cm^3

25. $d = 4$ ft
50.3 ft^2; 33.5 ft^3

26. $r = 0.8$ ft
8.0 ft^2; 2.1 ft^3

27. Sports Equipment The circumference of a lacrosse ball is 8 in. Find its volume to the nearest tenth of a cubic inch. 8.6 in.^{3}

Lesson 11-7

(G.11)(B) To use ratios to solve problems involving similar figures

(G.11)(D) To describe the effect on area and volume when one or more dimensions of a figure are changed and apply this idea in solving problems

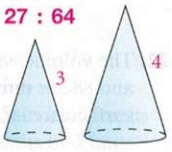
Similar solids have the same shape and all their corresponding dimensions are proportional.

If the **similarity ratio** of two similar solids is $a : b$, then the ratio of their corresponding surface areas is $a^2 : b^2$, and the ratio of their volumes is $a^3 : b^3$.

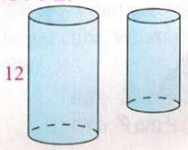
28. Open-Ended Sketch two similar solids whose surface areas are in the ratio 16 : 25. Include dimensions. See margin.

For each pair of similar solids, find the ratio of the volume of the first figure to the volume of the second.

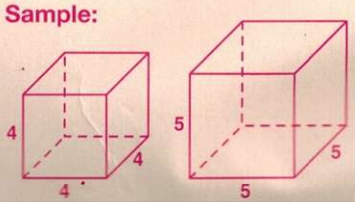
29. 27 : 64

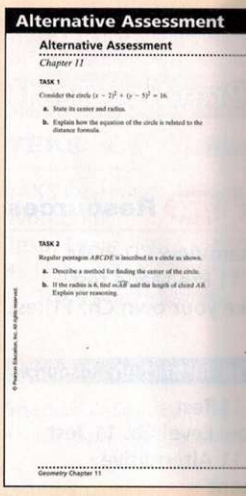


30. 64 : 27



28. Answers may vary. Sample:




Alternative Assessment

Alternative Assessment

Chapter 11

TASK 1

Consider the circle $(x-2)^2+(y-5)^2=16$.

a. State its center and radius.

b. Explain how the equation of the circle is related to the distance formula.

TASK 2

Regular pentagon $ABCDE$ is inscribed in a circle as shown.

a. Describe a method for finding the center of the circle.

b. If the radius is 6, find $m\overset{\frown}{AB}$ and the length of chord AB. Explain your reasoning.

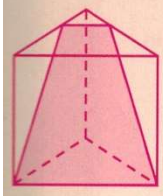
Geometry Chapter 11

equilateral △; 7 + 10 = 15 + 2

rectangle; 7 + 10 = 15 + 2

equilateral D; 7 + 7 = 12 + 2

regular hexagon; 7 + 10 = 15 + 2

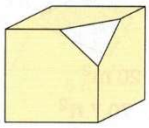


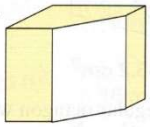
Chapter 11

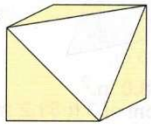
Extra Practice: Skills, Word Problems, and P

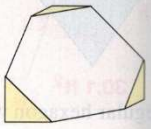
Lesson 11-1

The diagrams in Exercises 1–4 each show a cube after part of it has been cut away. Identify the shape of the cross section formed by the cut. Also, verify Euler's Formula, $F + V = E + 2$, for the polyhedron that remains. 1–5. See margin.

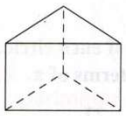
1. 

2. 

3. 

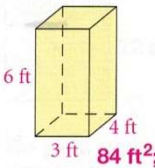
4. 

5. The bases of the prism shown at the right are equilateral triangles. Make a sketch that shows how you can have a plane intersect the prism to give a cross section that is an isosceles trapezoid.

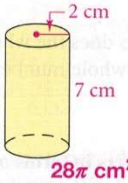


Lessons 11-2 and 11-3

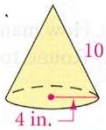
Find the (a) lateral area and (b) surface area of each figure. Leave your answers in terms of π or in simplest radical form.

6. 

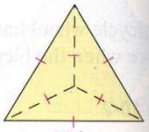
84 ft²; 108 ft²

7. 

28π cm²; 36π cm²

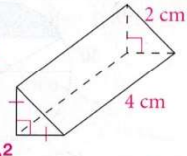
8. 

40π in.²; 56π in.²

9. 

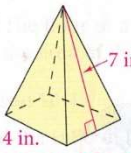
108√3 in.²; 144√3

10. 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. 19.3 cm²; 21.3 cm²

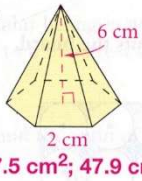


11. A company packages salt in a cylindrical box that has a diameter of 8 cm and a height of 13.5 cm. Find the lateral area and surface area of the box. Round to the nearest tenth. 339.3 cm²; 439.8 cm²

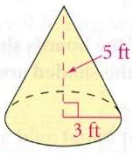
Find the (a) lateral area and (b) surface area of each pyramid or cone. Assume that the base of each pyramid is a regular polygon. Round your answers to the nearest tenth.

12. 

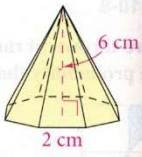
56 in.²; 72 in.²

13. 

37.5 cm²; 47.9 cm²

14. 

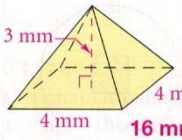
55.0 ft²; 83.2 ft²

15. 

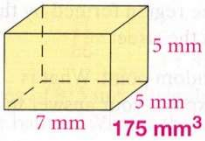
51.7 cm²; 71.0 cm²

Lessons 11-4 and 11-5

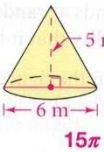
Find the volume of each figure. Round your answers to the nearest tenth.

16. 

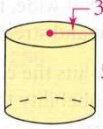
16 mm³

17. 

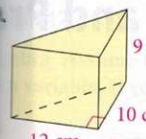
175 mm³

18. 

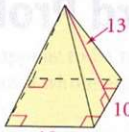
15π m³

19. 

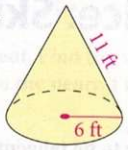
45π in.³

20. 

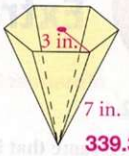
540 cm³

21. 

863.9 in.³

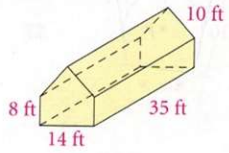
22. 

400 m³

23. 

339.3 ft³

24. A greenhouse has the dimensions shown in the figure. What is the volume of the greenhouse? Round to the nearest cubic foot. **5670 ft³**



25. 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. **486.0 cm³**

26. 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. **5.7 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 π and rounded to the nearest whole number.

27. $r = 5$ cm
28. $r = 3$ ft
29. $d = 8$ in.
30. $d = 2$ ft
31. $r = 0.5$ in.
32. $d = 9$ m

The surface area of each sphere is given. Find the volume of each sphere in terms of π.

33. 64π m² **$\frac{256\pi}{3}$ m³**
34. 16π in² **$\frac{32\pi}{3}$ in.³**
35. 49π ft² **$\frac{343\pi}{6}$ ft³**

36. 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. **9.62 ft²; 2.81 ft³**

Lesson 11-7

Copy and complete the table for three similar solids.

	Similarity Ratio	Ratio of Surface Areas	Ratio of Volumes
37.	2 : 3	4 ■ : ■ 9	8 ■ : ■ 27
38.	5 ■ : ■ 8	25 : 64	125 ■ : ■ 512
39.	3 ■ : ■ 4	9 ■ : ■ 16	27 : 64

40. How do the surface area and volume of a cylinder change if the radius and height are multiplied by $\frac{5}{4}$? **S.A. is multiplied by $\frac{15}{16}$. Volume is multiplied by $\frac{125}{64}$.**

41. For two similar solids, how are the ratios of their volumes and surface areas related? $\left(\frac{V_1}{V_2}\right)^2 = \left(\frac{A_1}{A_2}\right)^3$

27. $\frac{500\pi}{3}$ cm³, 524 cm³; 100π cm², 314 cm²

28. 36π ft³, 113 ft³; 36π ft², 113 ft²

29. $\frac{256\pi}{3}$ in.³, 268 in.³; 64π in.², 201 in.²

30. $\frac{4\pi}{3}$ ft³, 4 ft³; 4π ft², 13 ft²

31. $\frac{\pi}{6}$ in.³, 1 in.³; π in.², 3 in.²

32. $\frac{243\pi}{2}$ m³, 382 m³; 81π m², 254 m²