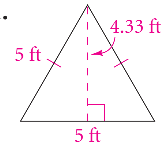
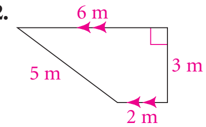
Chapter 10 Extra Practice: Skills, Word Problems, and Proof

Lesson 10-1

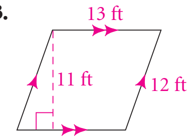
If possible, find the perimeter and area of each figure. If not possible, state why.

1. 

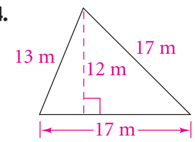
15 ft; 10.825 ft²

2. 

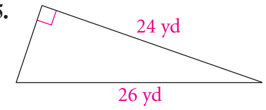
16 m; 12 m²

3. 

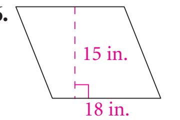
50 ft; 143 ft²

4. 

47 m; 102 m²

5. 

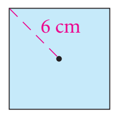
60 yd; 120 yd²

6. 

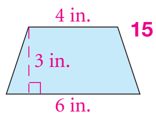
perimeter not possible as slanted sides could be any length; 270 in.²

Lessons 10-2 and 10-3

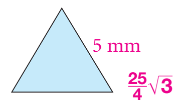
Find the area of each trapezoid or regular polygon. Leave your answer in simplest radical form.

7. 

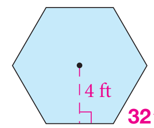
72 cm²

8. 

15 in.²

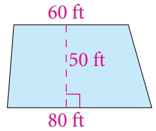
9. 

$\frac{25}{4}\sqrt{3}$ mm²

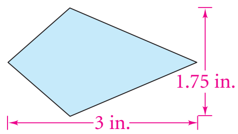
10. 

$32\sqrt{3}$ ft²

11. The patio section of a restaurant is a trapezoid with the dimensions shown in the figure. What is the area of the patio section? **3500 ft²**



12. A mosaic design uses kite-shaped tiles with the dimensions shown in the figure. What is the area of each tile? **2.625 in.²**

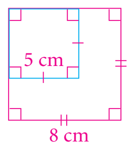


13. The tiles for a bathroom floor are regular hexagons that are $\frac{5}{8}$ in. on each side. Find the area of an individual tile. Express the answer in radical form. **$\frac{73\sqrt{3}}{128}$ in.²**

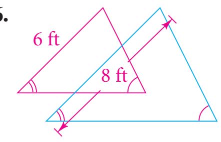
14. The floor of a gazebo is a regular hexagon with sides that are 9 ft long. What is the area of the floor? Round to the nearest square foot. **210 ft²**

Lesson 10-4

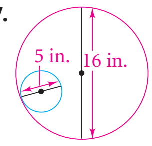
Find the ratio of the perimeters and the ratio of the areas of the blue figure to the red figure.

15. 

5 : 8; 25 : 64

16. 

3 : 4; 9 : 16

17. 

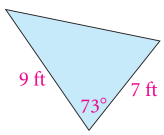
5 : 16; 25 : 256

18. A triangular banner has an area of 315 in.². A similar banner has sides $1\frac{1}{3}$ times as long as those of the smaller banner. What is the area of the larger banner? **560 in.²**

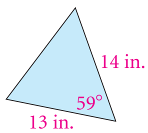
19. You want to enlarge the picture on the front of a postcard by 10%. If the perimeter of the postcard is 44 cm, what will be the perimeter of the enlargement? **48.4 cm**

Lesson 10-5

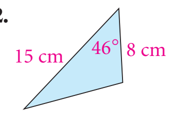
Find the area of each polygon. Round your answers to the nearest tenth.

20.


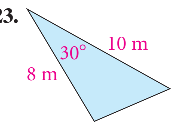
30.1 ft^2

21.


78.0 in.^{2}

22.


43.2 cm^2

23.


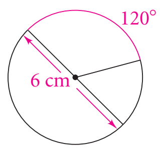
20 m^2

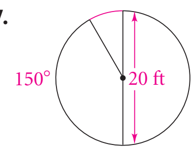
24. a regular hexagon with an apothem of 3 ft **31.2 ft^2**

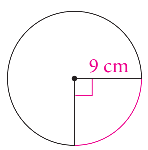
25. a regular octagon with radius 5 ft **70.7 ft^2**

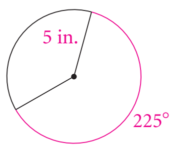
Lesson 10-6

(a) Find the circumference of each circle. (b) Find the length of the arc shown in red. Leave your answers in terms of π. **26–29. See margin.**

26.


27.


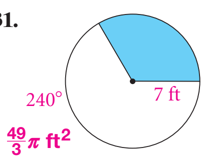
28.


29.


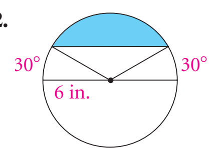
30. A bicycle wheel has a radius of 0.33 m. How many revolutions does the wheel make when the bicycle is ridden 1 km? Round to the nearest whole number. **482**

Lesson 10-7

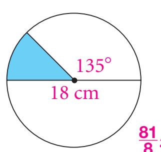
Find the area of each shaded sector or segment. Leave your answers in terms of π.

31.


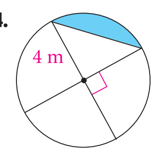
$\frac{49}{3}\pi$ ft^2

32.


$(12\pi - 9\sqrt{3})$ in.^{2}

33.


$\frac{81}{8}\pi$ cm^2

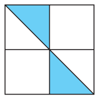
34.


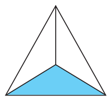
$(4\pi - 8)$ m^2

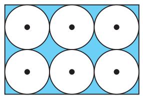
35. A 14-in. diameter pizza is cut into 6 equal slices. About how many square inches of pizza are in each slice? Round to the nearest square inch. **26 in.^{2}**

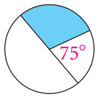
Lesson 10-8

Darts are thrown at random at each of the boards shown. If a dart hits the board, find the probability that it will land in the shaded area.

36.

$\frac{1}{4}$

37.

$\frac{1}{3}$

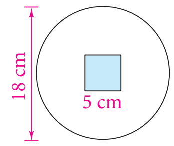
38.

$1 - \frac{\pi}{4}$

39.


$\frac{7}{24}$

40. A square garden that is 80 ft on each side is surrounded by a cobblestone street that is 8 ft wide. If a child's balloon lands at random in the region formed by the garden and street, what is the probability that it lands on the street? **$\frac{11}{36}$**

41. A dart hits the circular board shown in the figure at a random point. What is the probability that it does not hit the shaded square? Express your answer in terms of π. **$1 - \frac{25}{81\pi}$**



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26. a. 6π cm
b. 2π cm

27. a. 20π ft
b. $\frac{5}{3}\pi$ ft

28. a. 18π cm
b. $\frac{9}{2}\pi$ cm

29. a. 10π in.
b. $\frac{25}{4}\pi$ in.

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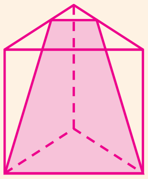
1. equilateral △; 7 + 10 = 15 + 2
2. rectangle; 7 + 10 = 15 + 2
3. equilateral D; 7 + 7 = 12 + 2
4. regular hexagon; 7 + 10 = 15 + 2
5.

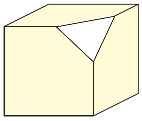


Chapter 11 Extra Practice: Skills, Word Problems, and Proof

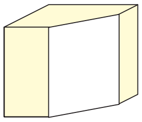
Lesson 11-1

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.**

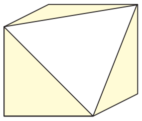
1.



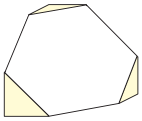
2.



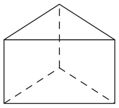
3.



4.



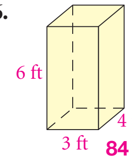
5. The bases of the prism shown at the right are equilateral triangles. Make a sketch that shows how you can have a plane intersect the prism to give a cross section that is an isosceles trapezoid.



Lessons 11-2 and 11-3

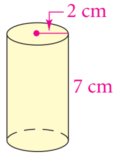
Find the (a) lateral area and (b) surface area of each figure. Leave your answers in terms of π or in simplest radical form.

6.



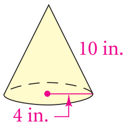
84 ft²; 108 ft² ($84\ ft^2$; $108\ ft^2$)

7.



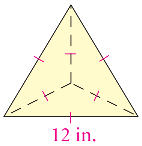
$28\pi\ cm^2$; $36\pi\ cm^2$

8.



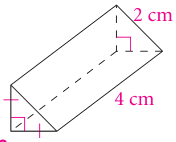
$40\pi\ in.^2$; $56\pi\ in.^2$

9.



$108\sqrt{3}\ in.^2$; $144\sqrt{3}\ in.^2$

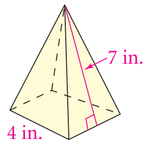
10. An optical instrument contains a triangular glass prism with the dimensions shown at the right. Find the lateral area and surface area of the prism. Round to the nearest tenth. $19.3\ cm^2$; $21.3\ cm^2$



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. $339.3\ cm^2$; $439.8\ cm^2$

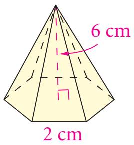
Find the (a) lateral area and (b) surface area of each pyramid or cone. Assume that the base of each pyramid is a regular polygon. Round your answers to the nearest tenth.

12.



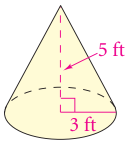
$56\ in.^2$; $72\ in.^2$

13.



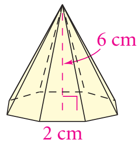
$37.5\ cm^2$; $47.9\ cm^2$

14.



$55.0\ ft^2$; $83.2\ ft^2$

15.

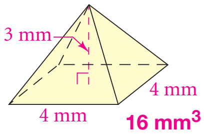


$51.7\ cm^2$; $71.0\ cm^2$

Lessons 11-4 and 11-5

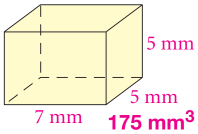
Find the volume of each figure. Round your answers to the nearest tenth.

16.



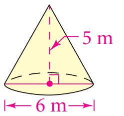
$16\ mm^3$

17.



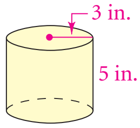
$175\ mm^3$

18.

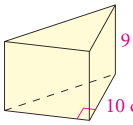


$15\pi\ m^3$

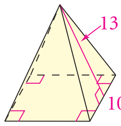
19.



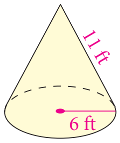
$45\pi\ in.^3$

20. 

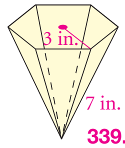
540 cm^3

21. 

863.9 in.^{3}

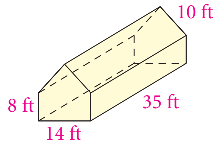
22. 

400 m^3

23. 

339.3 ft^3

24. A greenhouse has the dimensions shown in the figure. What is the volume of the greenhouse? Round to the nearest cubic foot. **5670 ft^3**



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 cm^3**

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 m^2 **$\frac{256\pi}{3}$ m^3** **34.** 16π in^2 **$\frac{32\pi}{3}$ in.^{3}** **35.** 49π ft^2 **$\frac{343\pi}{6}$ ft^3**

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 ft^2; 2.81 ft^3**

27. $\frac{500\pi}{3}$ cm^3, 524 cm^3; 100π cm^2, 314 cm^2

28. 36π ft^3, 113 ft^3; 36π ft^2, 113 ft^2

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

30. $\frac{4\pi}{3}$ ft^3, 4 ft^3; 4π ft^2, 13 ft^2

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

32. $\frac{243\pi}{2}$ m^3, 382 m^3; 81π m^2, 254 m^2

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? $\left(\frac{V_1}{V_2}\right)^2 = \left(\frac{A_1}{A_2}\right)^3$

Skills, Word Problems, and Proof

Skills, Word Problems, and Proof

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Extra Practice

5. Tangents to a ⊙ from a point outside the ⊙ are ≅, so $AS = AP$, $BP = BQ$, $CQ = CR$, and $DR = DS$. By the Segment Add. Post. and various Props. or =,

AB + DC =
AP + BP + DR + CR =
AS + BQ + DS + CQ =
BQ + CQ + AS + DS =
BC + AD

11. $a = 38$; $b = 52$; $c = 104$; $d = 90$

12. $a = 105$; $b = 100$

13. $a = 55$; $b = 72$; $c = 178$; $d = 89$

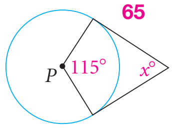
14. Yes. Each side of the polygon is a chord of the circle and the ⊥ bis. of any chord contains the center of the circle.

Chapter 12

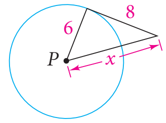
Extra Practice: Skills, Word Problems, and Proof

Lesson 12-1

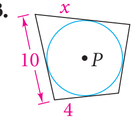
Algebra **Assume that lines that appear to be tangent are tangent. *P* is the center of each circle. Find the value of *x*.**

1. 

65

2. 

10

3. 

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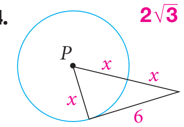
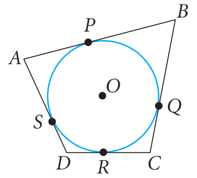
4. 

$2\sqrt{3}$

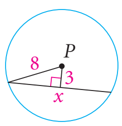
5. Given: Quadrilateral $ABCD$ is circumscribed about ⊙O.

Prove: $AB + DC = BC + AD$ See margin.

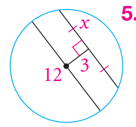


Lessons 12-2 and 12-3

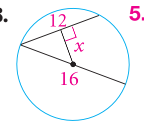
Algebra **Find the value of each variable. If your answer is not a whole number, round it to the nearest tenth.** 10–12. See margin.

6. 

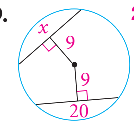
14.8

7. 

5.2

8. 

5.3

9. 

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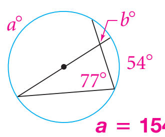
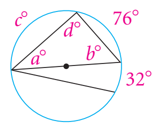
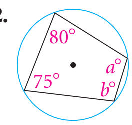
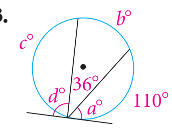
10. 

$a = 154$; $b = 76$

11. 

12. 

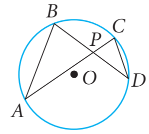
13. 

14. A polygon is inscribed in a circle. Are the perpendicular bisectors of the sides of the polygon concurrent? Explain. See margin.

15. A circle has a diameter of 4 units. A chord parallel to a diameter is 1.5 units from the center of the circle. The endpoints of the diameter and the chord are the vertices of an isosceles trapezoid. What is the distance from the center of the circle to each leg of the trapezoid? Round to the nearest hundredth. 1.82 units

16. Given: $\angle A$ and $\angle D$ are inscribed angles in ⊙O that intercept $\overset{\frown}{BC}$. $\overline{BD}$ and $\overline{AC}$ intersect at P.

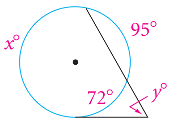
Prove: $\triangle APB \sim \triangle DPC$

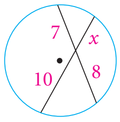


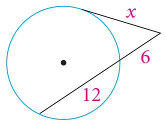
$\angle A \cong \angle D$ since they both intercept $\overset{\frown}{BC}$.
$\angle BPA \cong \angle CPD$ because they are vertical ∡.
$\triangle APB \sim \triangle DPC$ by AA ~.

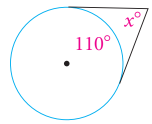
Lesson 12-4

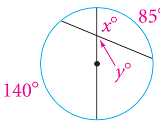
Algebra **Assume that lines that appear to be tangent are tangent. Find the value of each variable. If your answer is not a whole number, round it to the nearest tenth.** 17–20. See margin.

17. 

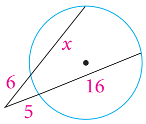
18. 

19. 

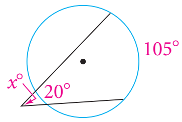
20. 

21. 

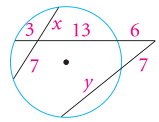
$x = 112.5; y = 67.5$

22. 

11.5

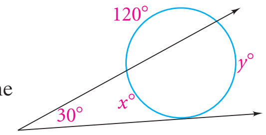
23. 

42.5

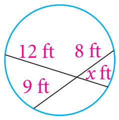
24. 

$x \approx 5.6; y \approx 11.9$

25. The outer rim of a circular garden will be planted with three colors of tulips. The landscaper has stretched two strings from a point P to help workers see how much of the circular rim should be planted with each color. Use the information in the figure at the right to find x and y. 90; 150



26. Planks are placed across the circular pool shown in the figure at the right. What is the length of the longest plank? 18 ft



Lesson 12-5

Write the standard equation for each circle with center P.

27. $P = (0, 0); r = 4$ $x^2 + y^2 = 16$

28. $P = (0, 5); r = 3$ $x^2 + (y - 5)^2 = 9$

29. $P = (9, -3); r = 7$ $(x - 9)^2 + (y + 3)^2 = 49$

30. $P = (-4, 0)$; through $(2, 1)$ $(x + 4)^2 + y^2 = 37$

31. $P = (-6, -2)$; through $(-8, 1)$ $(x + 6)^2 + (y + 2)^2 = 13$

32. $P = (-1, -3); r = 3$ $(x + 1)^2 + (y + 3)^2 = 9$

33. When a coordinate grid is imposed over a map, the location of a radio station is given by $(113, 215)$. A town located at $(149, 138)$ is at the outermost edge of the circular region where clear reception is assured.

a. Write an equation that describes the boundary of the clear reception region. $(x - 113)^2 + (y - 215)^2 = 85^2$

b. If the radio station boosts power to increase the size of the clear-reception region by a factor of 4, what will be the equation for the new boundary for clear reception? $(x - 113)^2 + (y - 215)^2 = 170^2$

Lesson 12-6

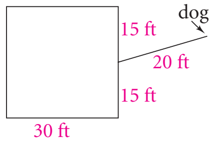
Draw and describe each locus. 34–36. See margin.

34. all points in a plane 3 cm from a circle with $r = 2$ cm

35. all points in a plane 2 cm from $\overrightarrow{AB}$

36. all points in space 1.5 in. from a point Q

37. A dog is on a 20-ft leash. The leash is attached to a pipe at the midpoint of the back wall of a 30 ft-by-30 ft house, as shown in the diagram. Sketch and use shading to indicate the region in which the dog can play while attached to the leash. Include measurements to describe the region. See margin.



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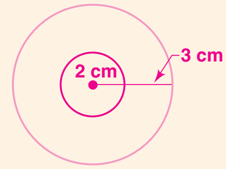
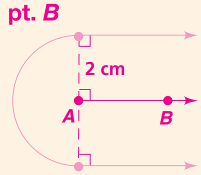
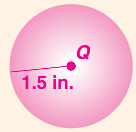
17. $x = 193; y = 60.5$
18. 5.6
19. ≈ 10.4
20. 70
34. a circle of radius 5 cm, concentric with the orig. circle



35. two rays ∥ to and 2 cm from $\overrightarrow{AB}$, and the semicircle of radius 2 cm with center A, opp. pt. B



36. a sphere of radius 1.5 in., and center Q



Skills, Word Problems, and Proof