Geometry 1-2
Area

UNIT 8

Name:_____
Teacher: _____ Per:___

My academic goal for this unit is...

Check for Understanding Key:

- ● Understanding at start of the unit
- | Understanding after practice
- ▲ Understanding before unit test

LEARNING TARGETS		How is my understanding?	Test Score	Retake?
8a	I can calculate the area of rectangles, parallelograms, triangles, trapezoids and kites.	1 2 3 4		
8b	I can calculate the area of regular polygons.	1 2 3 4		
8c	I can calculate an approximate area for irregular shapes.	1 2 3 4		
8d	I can calculate the area of circles.	1 2 3 4		
8e	I can calculate the area of portions of circles.	1 2 3 4		
8f	I can use area to determine geometric probability.	1 2 3 4		
8g	I can calculate surface area of 3D figures.	1 2 3 4		

What is the equation for calculating the area of a circle and why is the area of a circle calculated using this formula?

DP/1 **Developing Proficiency** Not yet, Insufficient	CP/2 **Close to Proficient** Yes, but..., Minimal	PR/3 **Proficient** Yes, Satisfactory	HP/4 **Highly Proficient** WOW, Excellent
I can't do it and am not able to explain process or key points	I can sort of do it and am able to show process, but not able to identify/explain key math points	I can do it and able to both explain process and identify/explain math points	I'm great at doing it and am able to explain key math points accurately in a variety of problems

Chapter 8 Conjectures

Title	***Conjecture***	***Diagram***
Rectangle Area Conjecture	The area of a rectangle is given by the formula_____, where A is the area, b is the length of the base and h is the height of the rectangle.	
Parallelogram Area Conjecture	The area of a parallelogram is given by the formula _____, where A is the area, b is the length of the base, and h is the height of the parallelogram.	
Triangle Area Conjecture	The area of a triangle is given by the formula _____, where A is the area, b is the length of the base, and h is the height of the triangle.	
Trapezoid Area Conjecture	The area of a trapezoid is given by the formula _____, where A is the area, b_1 and b_2 are the lengths of the two bases and h is the height of the trapezoid.	
Kite Are Conjecture	The area of a kite is given by the formula _____, where d_1 and d_2 are the lengths of the diagonals.	

Title	*Conjecture*	*Diagram*
Regular Polygon Area Conjecture	The area of a regular polygon is given by the formula _____, where A is the area, a is the apothem, s is the length of one sides and n is the number of sides. The length of each sides times the number of sides is the perimeter, P, so $sn = P$. Thus, you can also write the formula for area as $A =$ ____P.	
Circle Area Conjecture	The area of a circle is given by the formula _____, where A is the area and r is the radius of the circle.	

Additional Notes:

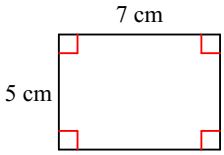
Notes

Notes

Practice: Area of Quadrilaterals & Triangles

Find the area of each.

1)



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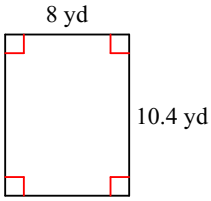

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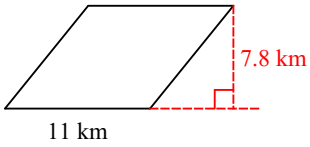

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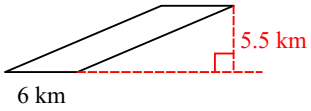

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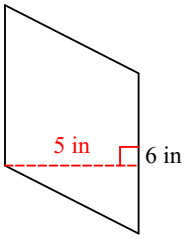

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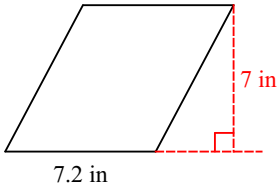

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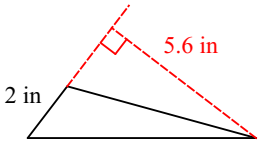

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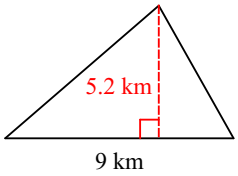

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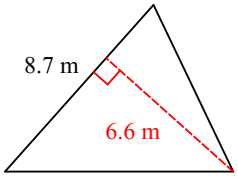

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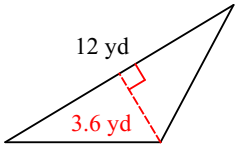

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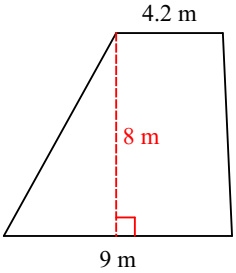

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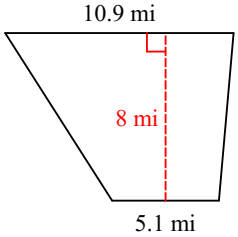

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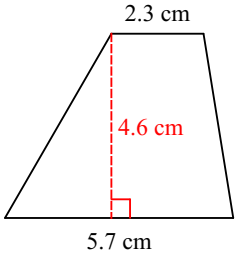

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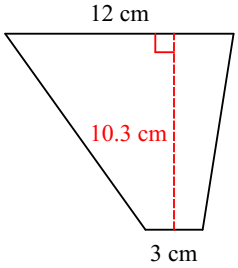
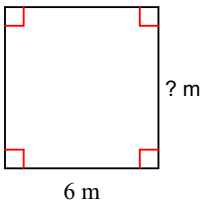


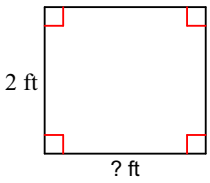
Find the missing measurement. Round your answer to the nearest tenth.

15)



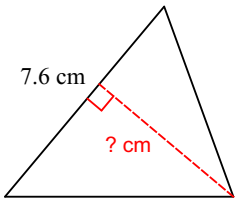
Area = 37.8 m²

16)



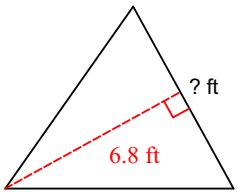
Area = 4.4 ft²

17)



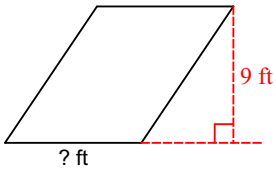
Area = 20.5 cm²

18)



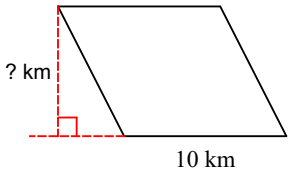
Area = 24.1 ft²

19)



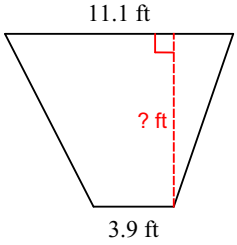
Area = 81 ft²

20)



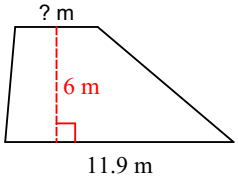
Area = 80 km²

21)



Area = 63 ft²

22)



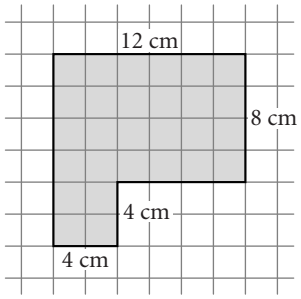
Area = 48.6 m²

Lesson 8.1 • Areas of Rectangles and Parallelograms

Name _____ **Period** _____ **Date** _____

In Exercises 1–4, find the area of the shaded region.

1.



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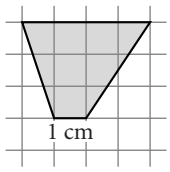

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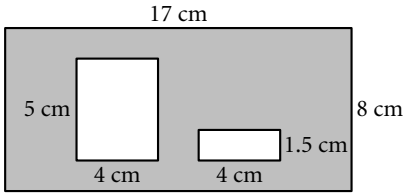
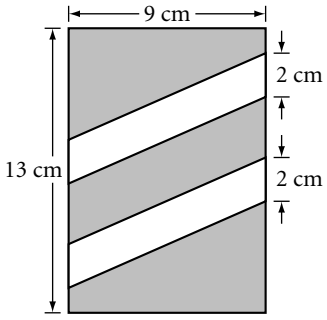


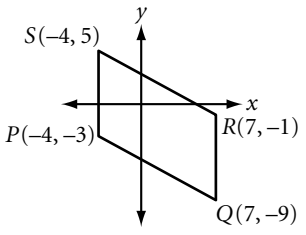
4.



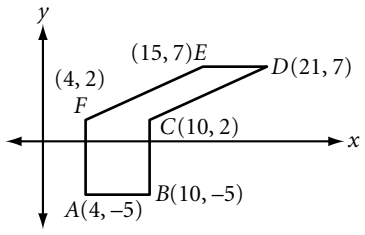
5. Rectangle *ABCD* has area 2684 m^2 and width 44 m. Find its length.

6. Draw a parallelogram with area 85 cm^2 and an angle with measure 40°. Is your parallelogram unique? If not, draw a different one.

7. Find the area of *PQRS*.



8. Find the area of *ABCDEF*.



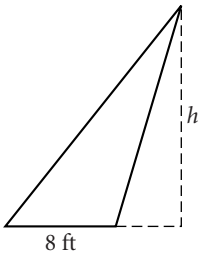
9. Dana buys a piece of carpet that measures 20 square yards. Will she be able to completely cover a rectangular floor that measures 12 ft 6 in. by 16 ft 6 in.? Explain why or why not.

Lesson 8.2 • Areas of Triangles, Trapezoids, and Kites

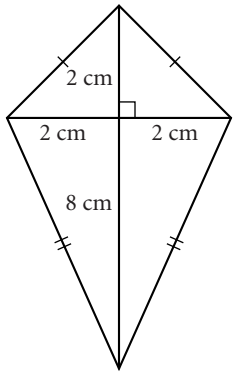
Name _____ **Period** _____ **Date** _____

In Exercises 1–4, solve for the unknown measures.

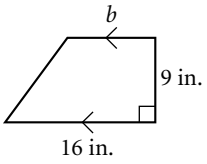
1. Area = 64 ft^2, h = _____.



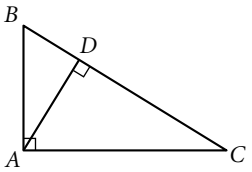
2. Area = _____.



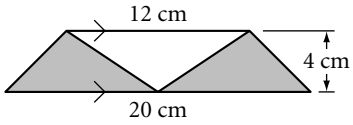
3. Area = 126 in^2
b = _____.



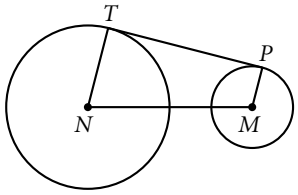
4. AB = 6 cm, AC = 8 cm, and BC = 10 cm. Find AD.



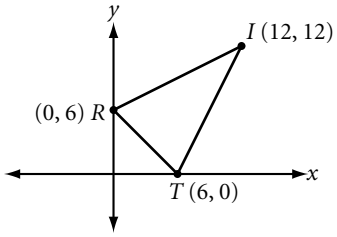
5. Find the area of the shaded region.



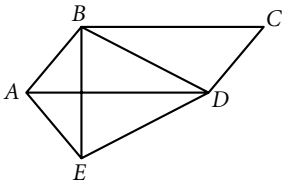
6. $\overline{TP}$ is tangent to circles M and N. TP = 16 cm. The radius of N is 7 cm and the radius of M is 4 cm. Find the area of $NMPT$.



7. Find the area of $\triangle TRI$.



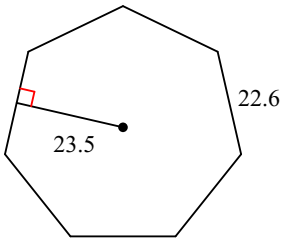
8. $ABCD$ is a parallelogram, $ABDE$ is a kite, AD = 18 cm, and BE = 10 cm. Find the area of $ABCDE$.



Practice: Area of Regular Polygons & Circles

Find the area of each regular polygon. Round your answer to the nearest tenth if necessary.

1)



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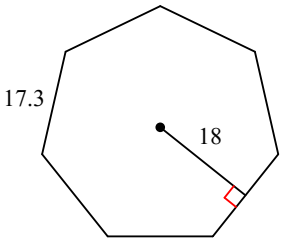

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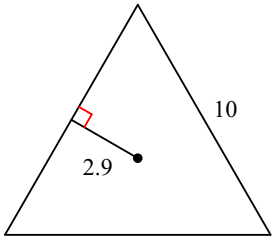

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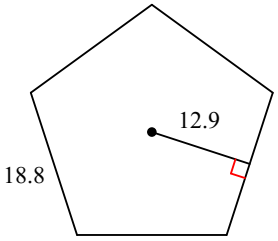

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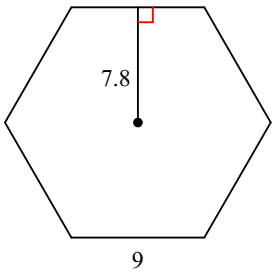

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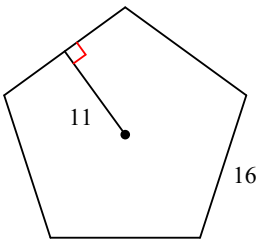

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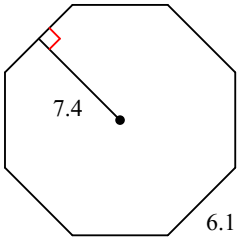

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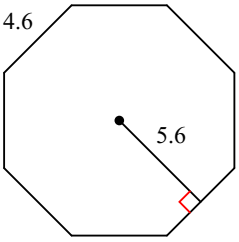
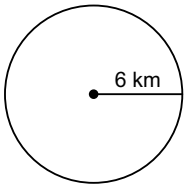


Find the area of each.

9)



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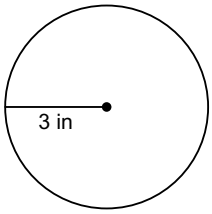

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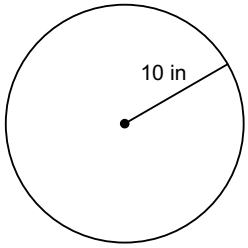

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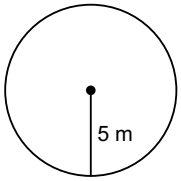

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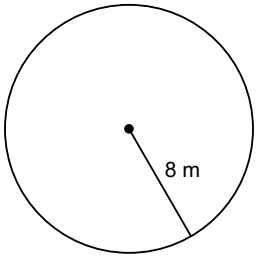

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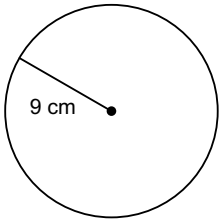

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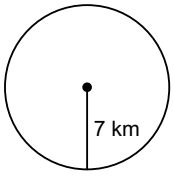
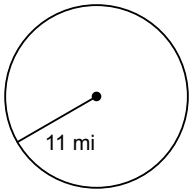


16)

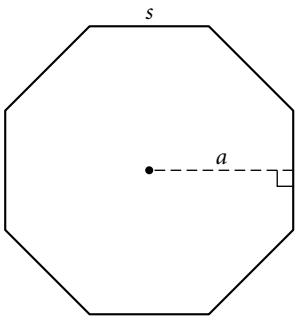


Lesson 8.4 • Areas of Regular Polygons

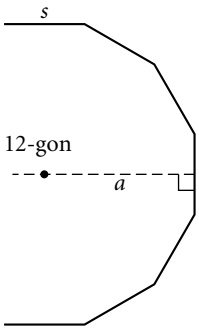
Name _____ **Period** _____ **Date** _____

In Exercises 1–3, the polygons are regular.

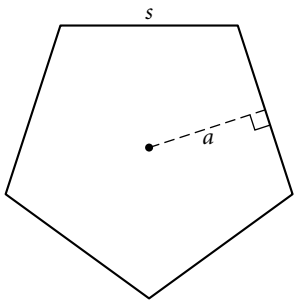
1. $s = 12$ cm
$a \approx 14.5$ cm
$A \approx$ _____



2. $s = 4.2$ cm
$A \approx 197$ cm^2
$a \approx$ _____



3. $a = 6$ cm
$A \approx 130.8$ cm^2
$p \approx$ _____

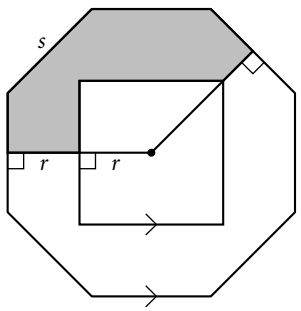


4. In a regular n-gon, $s = 4.8$ cm, $a \approx 7.4$ cm, and $A \approx 177.6$ cm^2. Find n.

5. Draw a regular pentagon so that it has perimeter 20 cm. Use the Regular Polygon Area Conjecture and a centimeter ruler to find its approximate area.

6. Use a compass and straightedge to construct a regular octagon and its apothem. Use a centimeter ruler to measure its side length and apothem, and use the Regular Polygon Area Conjecture to find its approximate area.

7. Find the area of the shaded region between the square and the regular octagon. $s \approx 5$ cm. $r = 3$ cm.



Lesson 8.5 • Areas of Circles

Name _____ **Period** _____ **Date** _____

In Exercises 1–4, write your answers in terms of π.

1. If $r = 9$ cm, $A =$ _____.

2. If $d = 6.4$ cm, $A =$ _____.

3. If $A = 529\pi$ cm^2, $r =$ _____.

4. If $C = 36\pi$ cm, $A =$ _____.

In Exercises 5–8, round your answers to the nearest 0.01 unit.

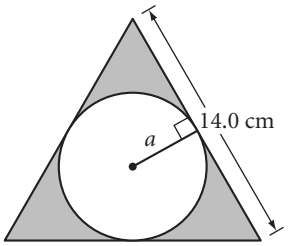
5. If $r = 7.8$ cm, $A \approx$ _____.

6. If $A = 136.46$, $C \approx$ _____.

7. If $d = 3.12$, $A \approx$ _____.

8. If $C = 7.85$, $A \approx$ _____.

For Exercises 9 and 10, refer to the figure of a circle inscribed in an equilateral triangle. Round your answers to the nearest 0.1 unit.



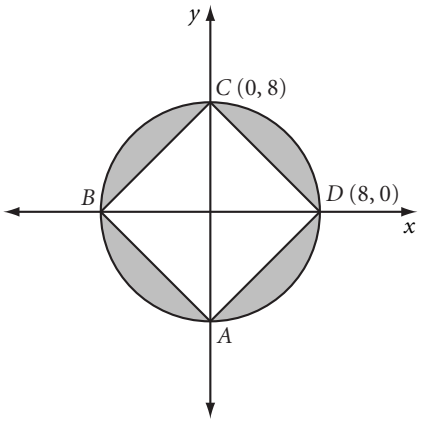
$a \approx 4.04$ cm

9. Find the area of the inscribed circle.

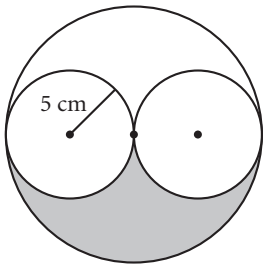
10. Find the area of the shaded region.

In Exercises 11 and 12, find the area of the shaded region. Write your answers in terms of π.

11. *ABCD* is a square.



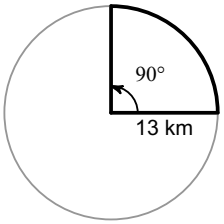
12. The three circles are tangent.



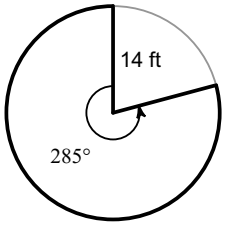
Practice: Area of Sectors

Find the area of each sector.

1)



2)



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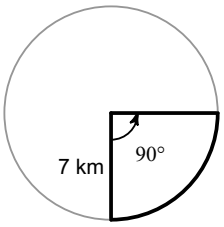
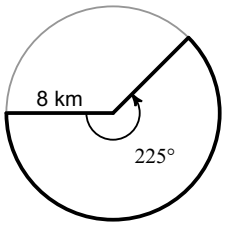
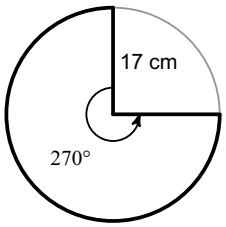


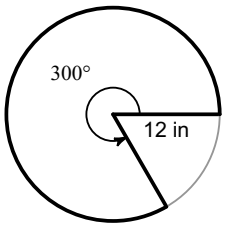
4)



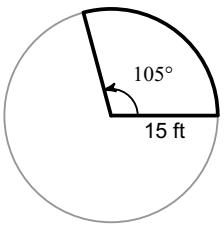
5)



6)



7)



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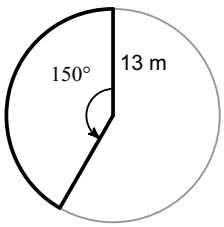

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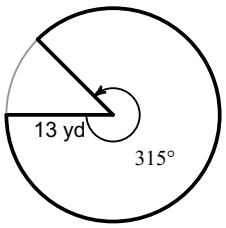

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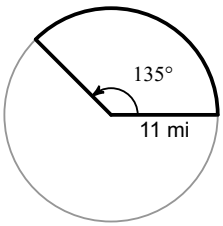
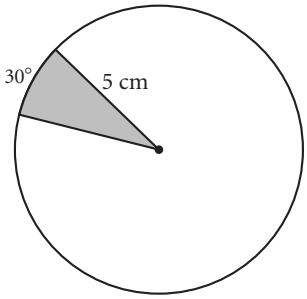


Lesson 8.6 • Any Way You Slice It

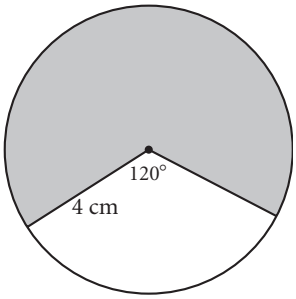
Name _____ **Period** _____ **Date** _____

In Exercises 1–6, find the area of the shaded region. Write your answers in terms of π and rounded to the nearest 0.01 cm^2.

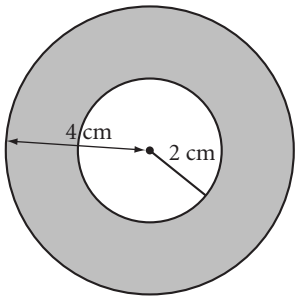
1.



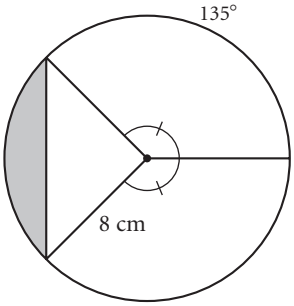
2.



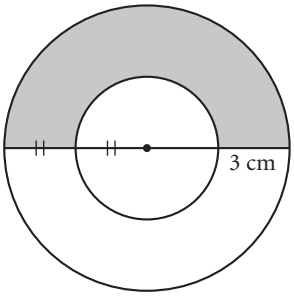
3.



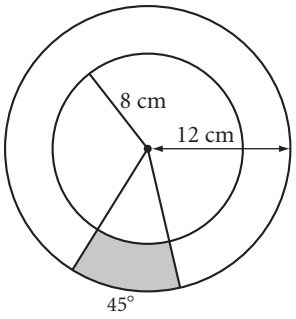
4.



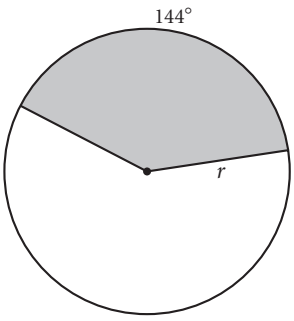
5.



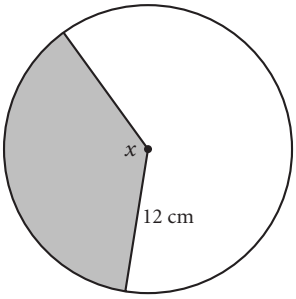
6.



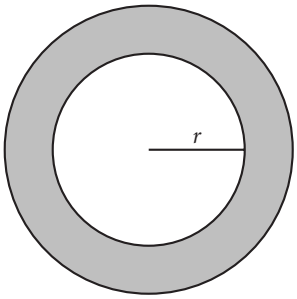
7. Shaded area is 40π cm^2. Find r.



8. Shaded area is 54π cm^2. Find x.



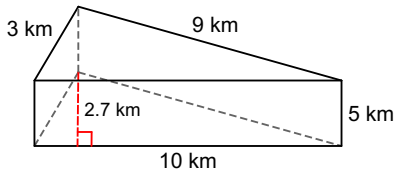
9. Shaded area is 51π cm^2. The diameter of the larger circle is 20 cm. Find r.



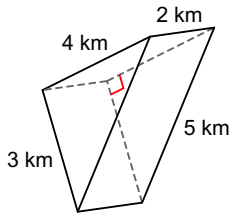
Practice: Surface Area

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

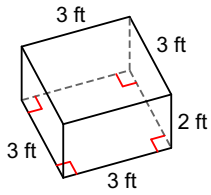
1)



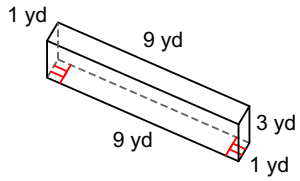
2)



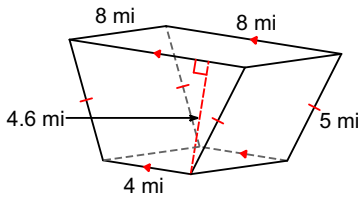
3)



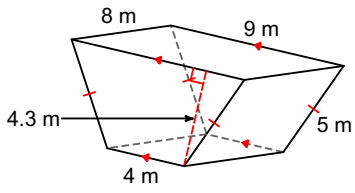
4)



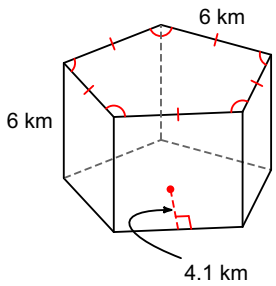
5)



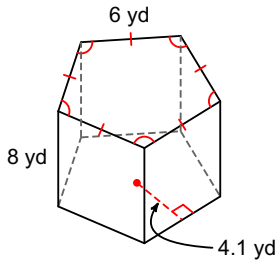
6)



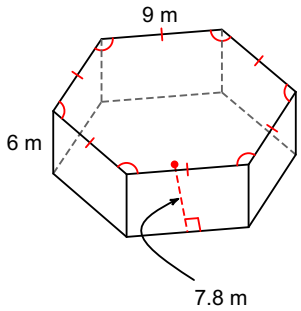
7)



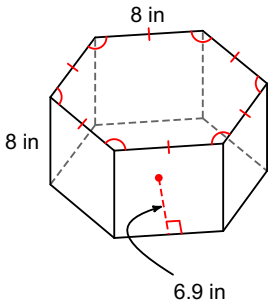
8)



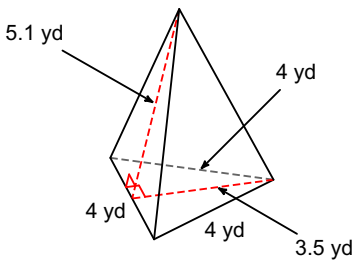
9)



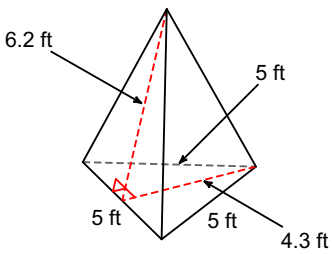
10)



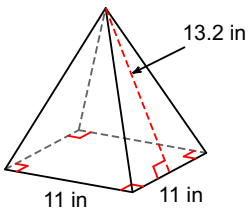
11)



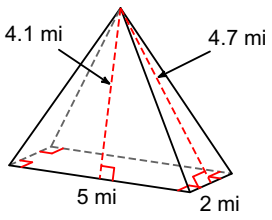
12)



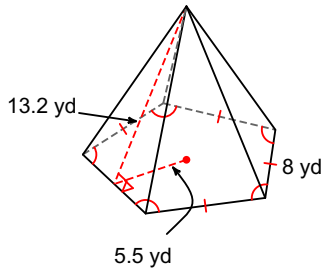
13)



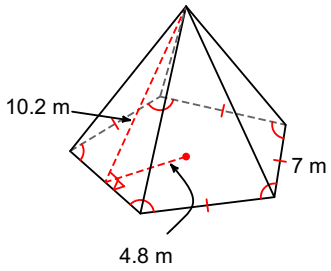
14)



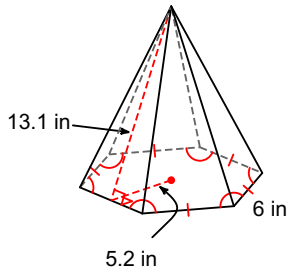
15)



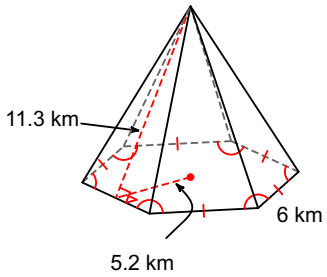
16)



17)

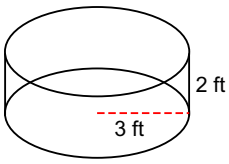


18)

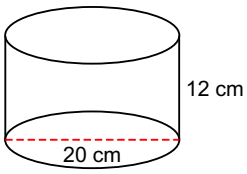


Find the lateral area and surface area of each figure. Round your answers to the nearest hundredth, if necessary. Leave your answers in terms of π for answers that contain π.

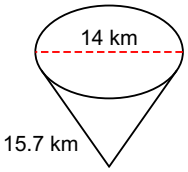
19)



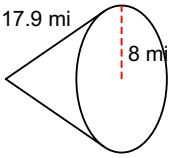
20)



21)



22)

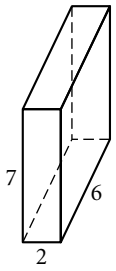


Lesson 8.7 • Surface Area

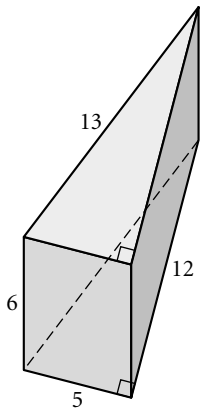
Name _____ **Period** _____ **Date** _____

In Exercises 1–8, find the surface area of each solid. All quadrilaterals are rectangles, and all measurements are in centimeters. Round your answers to the nearest 0.1 cm^2.

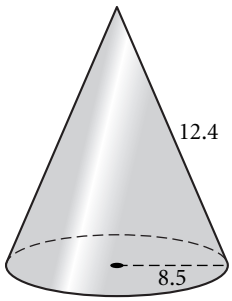
1.



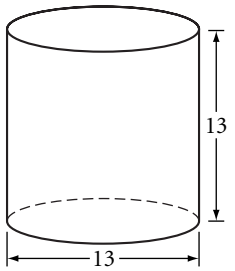
2.



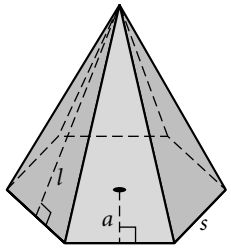
3.



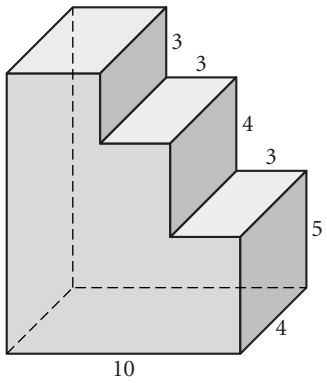
4.



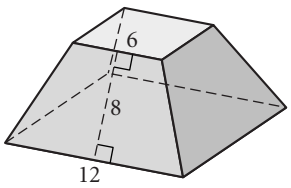
5. Base is a regular hexagon. $s = 6$, $a \approx 5.2$, and $l = 9$.



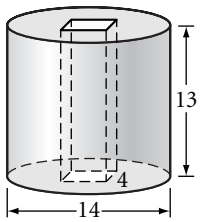
6.



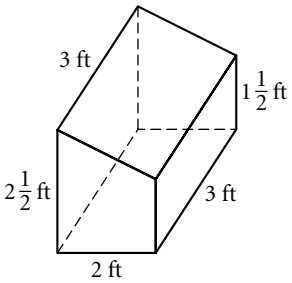
7. Both bases are squares.



8. A square hole in a round peg



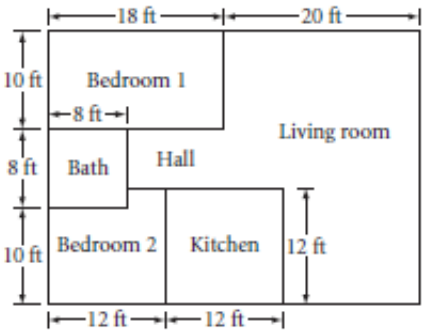
9. Ilsa is building a museum display case. The sides and bottom will be plywood and the top will be glass. Plywood comes in 4 ft-by-8 ft sheets. How many sheets of plywood will she need to buy? Explain. Sketch a cutting pattern that will leave her with the largest single piece possible.



Unit 8 • Challenge Problems

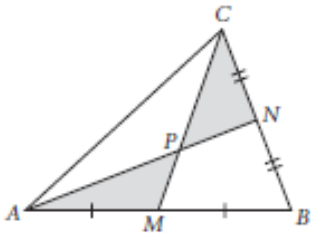
1. (*Target 8a*)
   Sabrina wants to paint the walls (including the doors) and ceiling of the two bedrooms, the hall, and the living room of her apartment. A gallon of TJ Base Paint covers 325 sq. ft. and costs $19.99. A gallon of ABOT Base Paint covers 400 sq. ft. and costs $26.39. All the ceilings are 7 ft. high.

   a. Which brand of paint is cheaper per square foot?
   b. How many gallons of each would Sabrina need to buy? Show all your work.
   c. Which is the cheaper brand to use for this job?
   d. Explain the apparent contradiction between the answers to parts a and c.



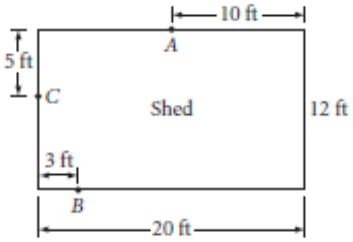
2. (*Target 8b*)
   $\overline{AN}$ and $\overline{CM}$ are medians.

   a. If the area of ΔABC is 48 units2, what are the areas of ΔAMC and ΔCNA? Explain.
   b. Explain why the area of ΔAMP is equal to the area of ΔCNP.
   c. The area of ΔAMP is what fraction of the area of ΔABC? Explain.



Unit 8 • Challenge Problems

3. (*Target 8c and 8e*)
Raul ties his dog, Spot, to the side of a shed with a 20 ft. leash. He has a movable hook so he can secure the leash anywhere along the shed walls.



a. Over what area can Spot play if the leash is fastened at point A? If the leash is fastened at B? If the leash is fastened at C? For each case, make a sketch, with relevant measurements labeled, and show all your work.
b. Where should Raul secure the leash so Spot has maximum area? What is the maximum area? Make a sketch to illustrate your answer.

4. (*Target 8a and 8e*)
Imagine that you have 27 small cubes, each with edge length 1 cm.
a. The cubes are scattered on a table so that no cube is touching any other cube. What is the total surface area of all the cubes?
b. Arrange the cubes end-to-end to form a 27-cube "train." Make a sketch of the train. What is its surface area?
c. Next, arrange the cubes to form a set of steps, 3 cm wide. A 3-by-4 rectangle of cubes is on the bottom, a 3-by-3 rectangle of cubes is on top of that, and a 3-by-2 rectangle of cubes is on top of that. Make a sketch of the steps. What is the surface area of the steps?
d. Make a sketch showing an arrangement of 27 cubes with surface area 78 cm^2.
e. Make a sketch showing an arrangement of 27 cubes with surface area 90 cm^2.
f. What is the largest surface area you can make? What is the smallest surface area you can make? Describe how the cubes must be arranged to get the largest and smallest surface area.

Unit 8 • Challenge Problems

5. (*Targets 8c, 8d, 8e and 8g*)
   A cone is 16 cm high and has a base radius of 12 cm. A cut is made through the cone 4 cm from the vertex and parallel to the base. The discarded top is a cone with base diameter 6 cm and slant height 5 cm. The part that remains is a frustum with slant height 15 cm. A hole with radius 3 cm is drilled through the frustum, from the center of one base to the center of the other. The drilled frustum is then dipped in a vat of paint.

   a. Sketch the original cone, the undrilled frustum, the discarded cone, and the drilled frustum. Label all relevant measurements.

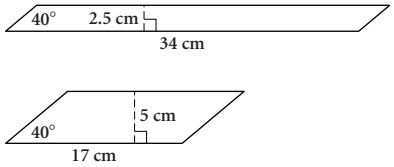
   b. Calculate the *exact* area of the painted surface of the frustum. Explain the steps in your calculation procedure.

LESSON 8.1 • Areas of Rectangles and Parallelograms

1. 112 cm^2 **2.** 7.5 cm^2 **3.** 110 cm^2 **4.** 81 cm^2

5. 61 m

6. No. Possible answer:



7. 88 units^2 **8.** 72 units^2

9. No. Carpet area is 20 yd^2 = 180 ft^2. Room area is (21.5 ft)(16.5 ft) = 206.25 ft^2. Dana will be $26\frac{1}{4}$ ft^2 short.

LESSON 8.2 • Areas of Triangles, Trapezoids, and Kites

1. 16 ft **2.** 20 cm^2

3. b = 12 in. **4.** AD = 4.8 cm

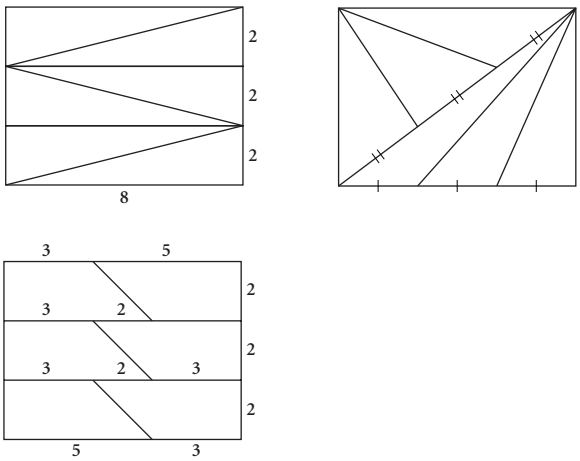
5. 40 cm^2 **6.** 88 cm^2 **7.** 54 units^2 **8.** 135 cm^2

LESSON 8.3 • Area Problems

1. a. 549.5 ft^2 **b.** 40 bundles; $1596.00

2. 500 L

3. Possible answer:



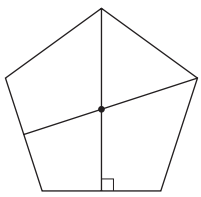
4. It is too late to change the area. The length of the diagonals determines the area.

LESSON 8.4 • Areas of Regular Polygons

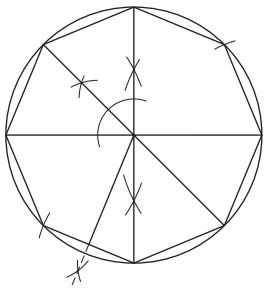
1. $A \approx 696$ cm^2 **2.** $a \approx 7.8$ cm

3. $p \approx 43.6$ cm **4.** n = 10

5. s = 4 cm, $a \approx 2.8$ cm, $A \approx 28$ cm^2



6. Possible answer (s will vary): $s \approx 3.1$ cm, $a \approx 3.7$ cm, $A \approx 45.9$ cm^2



7. Approximately 31.5 cm^2: area of square = 36; area of square within angle = $\frac{3}{8} \cdot 36 = 13.5$; area of octagon $\approx$ 120; area of octagon within angle $\approx \frac{3}{8} \cdot 120 \approx 45$; shaded area $\approx 45 - 13.5 \approx 31.5$ cm^2

LESSON 8.5 • Areas of Circles

1. 81π cm^2 **2.** 10.24π cm^2 **3.** 23 cm

4. 324π cm^2 **5.** 191.13 cm^2 **6.** 41.41 cm

7. 7.65 cm^2 **8.** 4.90 cm^2 **9.** 51.3 cm^2

10. 33.5 or 33.6 cm^2

11. $(64\pi - 128)$ square units

12. 25π cm^2

LESSON 8.6 • Any Way You Slice It

1. $\frac{25\pi}{12}$ cm$^2 \approx 6.54$ cm^2

2. $\frac{32\pi}{3}$ cm$^2 \approx 33.51$ cm^2

3. 12π cm$^2 \approx 37.70$ cm^2

4. $(16\pi - 32)$ cm$^2 \approx 18.27$ cm^2

5. 13.5π cm$^2 \approx 42.41$ cm^2

6. 10π cm$^2 \approx 31.42$ cm^2

7. r = 10 cm **8.** x = 135° **9.** r = 7 cm

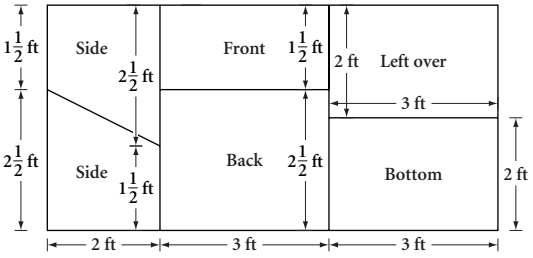
LESSON 8.7 • Surface Area

1. 136 cm^2 **2.** 240 cm^2 **3.** 558.1 cm^2

4. 796.4 cm^2 **5.** 255.6 cm^2 **6.** 356 cm^2

7. 468 cm^2 **8.** 1055.6 cm^2

9. 1 sheet: front rectangle: $3 \cdot 1\frac{1}{2} = 4\frac{1}{2}$; back rectangle: $3 \cdot 2\frac{1}{2} = 7\frac{1}{2}$; bottom rectangle: $3 \cdot 2 = 6$; side trapezoids: $2\left(2 \cdot \frac{2\frac{1}{2} + 1\frac{1}{2}}{2}\right) = 8$; total = 26 ft^2. Area of 1 sheet = $4 \cdot 8 = 32$ ft^2. Possible pattern:



Answers to Practice: Area of Quadrilaterals & Triangles

1) 35 cm^2
2) 83.2 yd^2
3) 85.8 km^2
4) 33 km^2
5) 30 in^2
6) 50.4 in^2
7) 5.6 in^2
8) 23.4 km^2
9) 28.71 m^2
10) 21.6 yd^2
11) 52.8 m^2
12) 64 mi^2
13) 18.4 cm^2
14) 77.25 cm^2
15) 6.3 m
16) 2.2 ft
17) 5.4 cm
18) 7.1 ft
19) 9 ft
20) 8 km
21) 8.4 ft
22) 4.3 m

Answers to Practice: Area of Regular Polygons & Circles

1) 1858.9
2) 1089.9
3) 43.5
4) 606.3
5) 210.6
6) 440
7) 180.6
8) 103
9) 36π km^2
10) 9π in^2
11) 100π in^2
12) 25π m^2
13) 64π m^2
14) 81π cm^2
15) 49π km^2
16) 121π mi^2

Answers to Practice: Area of Sectors

1) $\frac{169\pi}{4}$ km^2
2) $\frac{931\pi}{6}$ ft^2
3) $\frac{49\pi}{4}$ km^2
4) 40π km^2
5) $\frac{867\pi}{4}$ cm^2
6) 120π in^2
7) $\frac{525\pi}{8}$ ft^2
8) $\frac{845\pi}{12}$ m^2
9) $\frac{1183\pi}{8}$ yd^2
10) $\frac{363\pi}{8}$ mi^2

Answers to Practice: Surface Area

1) 110 km^2; 137 km^2
2) 24 km^2; 36 km^2
3) 24 ft^2; 42 ft^2
4) 60 yd^2; 78 yd^2
5) 176 mi^2; 231.2 mi^2
6) 184 m^2; 239.9 m^2
7) 180 km^2; 303 km^2
8) 240 yd^2; 363 yd^2
9) 324 m^2; 745.2 m^2
10) 384 in^2; 715.2 in^2
11) 30.6 yd^2; 37.6 yd^2
12) 46.5 ft^2; 57.25 ft^2
13) 290.4 in^2; 411.4 in^2
14) 29.9 mi^2; 39.9 mi^2
15) 264 yd^2; 374 yd^2
16) 178.5 m^2; 262.5 m^2
17) 235.8 in^2; 329.4 in^2
18) 203.4 km^2; 297 km^2
19) 12π ft^2; 30π ft^2
20) 240π cm^2; 440π cm^2
21) 109.9π km^2; 158.9π km^2
22) 143.2π mi^2; 207.2π mi^2