

NAME _____

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11-2 Study Guide and Intervention (continued)

Areas of Trapezoids, Rhombi, and Kites

Areas of Rhombi and Kites A rhombus is a parallelogram with all four sides congruent. A kite is a quadrilateral with exactly two pairs of consecutive sides congruent.

Area of Rhombus or Kite	If a rhombus or kite has an area of A square units, and diagonals of d_1 and d_2 units, then $A = \frac{1}{2} \cdot d_1 \cdot d_2$
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Example Find the area of the rhombus.

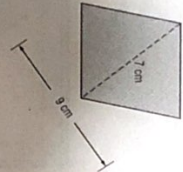
$$A = \frac{1}{2} d_1 d_2$$

$$= \frac{1}{2} (7)(9)$$

$$= 31.5$$

Simplify.

The area is 31.5 square meters.

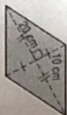


Exercises

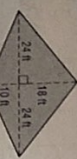
Find the area of each rhombus or kite.



1640 in²



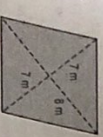
400 cm²



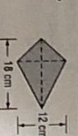
672 ft²



338 cm²



112 m²



108 cm²

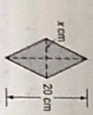
ALGEBRA Find x .

7. $A = 164 \text{ ft}^2$



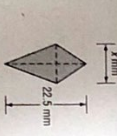
$x = 10 \text{ ft}$

8. $A = 340 \text{ cm}^2$



$x = 17 \text{ cm}$

9. $A = 247.5 \text{ mm}^2$



$x = 22 \text{ mm}$

Chapter 11

Glencoe Geometry

NAME _____

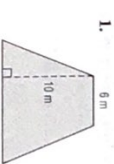
DATE _____

PERIOD _____

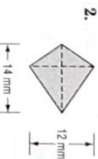
11-2 Skills Practice

Areas of Trapezoids, Rhombi, and Kites

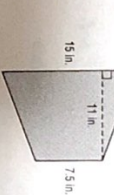
Find the area of each trapezoid, rhombus, or kite.



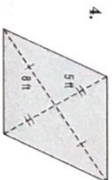
105 m²



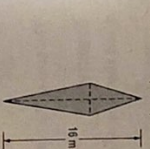
84 mm²



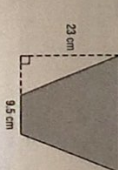
123.75 in²



80 ft²



32 m²



447.75 cm²

ALGEBRA Find each missing length.

7. A trapezoid has base lengths of 6 and 15 centimeters with an area of 136.5 square centimeters. What is the height of the trapezoid?

13 cm

8. One diagonal of a kite is four times as long as the other diagonal. If the area of the kite is 72 square meters, what are the lengths of the diagonals?

6 m; 24 m

9. A trapezoid has a height of 24 meters, a base of 4 meters, and an area of 264 square meters. What is the length of the other base?

18 m

Chapter 11

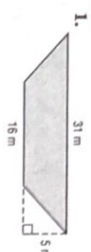
15

Glencoe Geometry

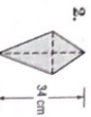
11-2 Practice

Areas of Trapezoids, Rhombi, and Kites

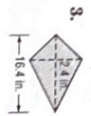
Find the area of each trapezoid, rhombus, or kite.



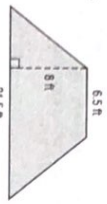
117.5 m²



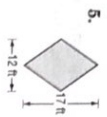
187 cm²



39.36 in²



112 ft²



102 ft²



20 cm²

ALGEBRA Find each missing length.

7. A trapezoid has base lengths of 19.5 and 24.5 centimeters with an area of 154 cm². What is the height of the trapezoid?
7 cm

8. One diagonal of a kite is twice as long as the other diagonal. If the area of the kite is 400 square meters, what are the lengths of the diagonals?
20 m, 40 m

9. A trapezoid has a height of 40 inches, a base of 15 inches, and an area of 2400 square inches. What is the length of the other base?
105 in.

10. **DESIGN** Mr. Hazraty used 16 congruent rhombi-shaped tiles to design the midsection of the backsplash area above a kitchen sink. The length of the design is 27 inches and the total area is 108 square inches.

a. Find the area of one rhombus.

$6\frac{3}{4}$ in²

b. Find the length of each diagonal.

$4\frac{1}{2}$ in., 3 in.

11-2 Word Problem Practice

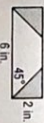
Areas of Trapezoids, Rhombi, and Kites

1. **INTERIOR DESIGN** The 20-by-20-foot square shows an office floor plan composed of three indoor gardens and one walkway, all congruent in shape. The gardens are centered around a 15-by-15 foot lounging area. What is the area of one of these gardens?



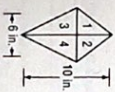
43.75 ft²

2. **CUTOUTS** A trapezoid is cut from a 6-inch-by-2-inch rectangle. The length of one base is 6 inches. What is the area of the trapezoid?



8 in²

3. **SHARING** Bernard has a birthday cake shaped like a kite. He needs to cut it into four pieces to share with three friends. He divides the cake as shown below. Which piece(s) is the largest? What is the area of the cake?



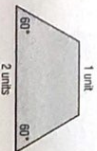
Pieces 3 and 4 are the largest; area of cake = 30 in²

4. **HEXAGONS** Heather makes a hexagon by attaching two trapezoids together as shown. What is the area of the hexagon?

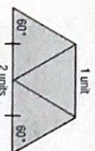


675 cm²

5. **TILING** The making often requires an artist to find clever ways of dividing a shape into several smaller, congruent shapes. Consider the isosceles trapezoid shown below.

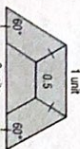


a. Show how to divide the trapezoid into 3 congruent triangles. What is the area of each triangle?



$\frac{\sqrt{3}}{4}$ units²

b. Show how to divide the trapezoid into 4 congruent trapezoids. What is the area of each of the smaller trapezoids?



$\frac{3\sqrt{3}}{16}$ units²

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11-3 Study Guide and Intervention *(continued)*

Areas of Sectors

A sector of a circle is a region bounded by a central angle and its intercepted arc.

If a sector of a circle has an area of A square units, a central angle measuring x° , and a radius of r units, then $A = \frac{x}{360} \pi r^2$.

Example Find the area of the shaded sector.



$$A = \frac{x}{360} \cdot \pi r^2$$

$$= \frac{36}{360} \cdot \pi(5)^2$$

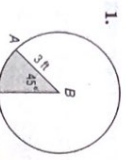
$$\approx 7.85$$

Use a calculator.

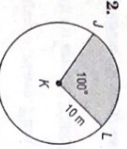
The area of the sector is about 7.85 square inches.

Exercises

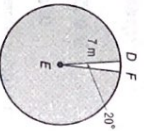
Find the area of each shaded sector. Round to the nearest tenth.



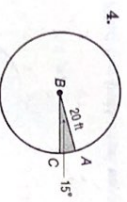
3.5 ft²



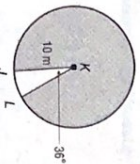
87.3 m²



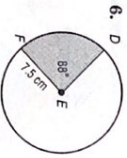
145.4 m²



52.4 ft²



282.7 m²



43.2 cm²



6.5 in²

7. SANDWICHES For a party, Samantha wants to have finger sandwiches. She cuts sandwiches into circles. If she cuts each circle into three congruent pieces, what is the area of each piece?

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Glencoe Geometry

Answers

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11-3 Skills Practice

Areas of Circles and Sectors

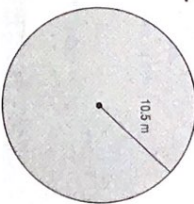
Find the area of each circle.



153.9 m²



254.5 in²



346.4 m²

Find the indicated measure. Round to the nearest tenth.

4. The area of a circle is 132.7 square centimeters. Find the diameter.

13.0 cm

5. Find the diameter of a circle with an area of 1134.1 square millimeters.

38.0 mm

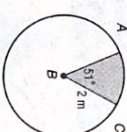
6. The area of a circle is 706.9 square inches. Find the radius.

15.0 in.

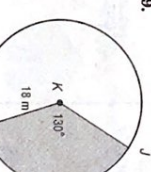
7. Find the radius of a circle with an area of 2827.4 square feet.

30.0 ft

Find the area of each shaded sector. Round to the nearest tenth.



1.8 m²



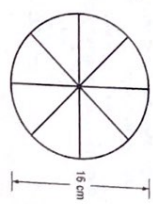
367.6 cm²



331.4 m²

11. GAMES Jason wants to make a spinner for a new board game he invented. The spinner is a circle divided into 8 congruent pieces. What is the area of each piece to the nearest tenth?

25.1 cm²



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Glencoe Geometry

Lesson 11-3

Answers (Lesson 11-3)

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11-3 Practice

Areas of Circles and Sectors

Find the area of each circle. Round to the nearest tenth.



7.1 m²



452.4 in²



63.6 cm²

Find the indicated measure. Round to the nearest tenth.

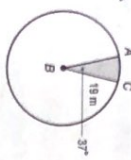
4. The area of a circle is 3.14 square centimeters. Find the diameter. **2.0 cm**

5. Find the diameter of a circle with an area of 855.3 square millimeters. **33.0 mm**

6. The area of a circle is 201.1 square inches. Find the radius. **8.0 in.**

7. Find the radius of a circle with an area of 2290.2 square feet. **27.0 ft**

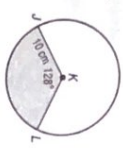
Find the area of each shaded sector. Round to the nearest tenth.



116.6 m²



110.6 in²



111.7 cm²

11. **CLOCK** Sadie wants to draw a clock face on a circular piece of cardboard. If the clock face has a diameter of 20 centimeters and is divided into congruent pieces so that each sector is 30°, what is the area of each piece? **26.2 cm²**

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Glencoe Geometry

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11-3 Word Problem Practice

Areas of Circles and Sectors

1. **LOBBY** The lobby of a bank features a large marble circular table. The diameter of the circle is 15 feet.



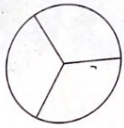
What is the area of the circular table? Round your answer to the nearest tenth.

176.7 ft²

2. **PORTRHOLES** A circular window on a ship has a radius of 8 inches. What is the area of the window? Round your answer to the nearest hundredth.

201.06 in²

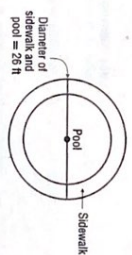
3. **PEACE SYMBOL** The symbol below, a circle separated into 3 equal sectors, has come to symbolize peace.



Suppose the circle has radius r . What is the area of each sector?
 $\frac{1}{3}\pi r^2$ or $0.33\pi r^2$

4. **SOUP CAN** Julie needs to cover the top and bottom of a can of soup with construction paper to include in her art project. Each circle has a diameter of 7.5 centimeters. What is the total area of the can that Julie must cover?
88.4 cm²

5. **POOL** A circular pool is surrounded by a circular sidewalk. The circular sidewalk is 3 feet wide. The diameter of the sidewalk and pool is 26 feet.



a. What is the diameter of the pool?
20 ft

b. What is the area of the sidewalk and pool?
169π ≈ 530.9 ft²

c. What is the area of the pool?
100π ≈ 314.2 ft²

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Glencoe Geometry

Lesson 11-3

Answers (Lesson 11-3)

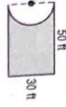
NAME _____ DATE _____ PERIOD _____

11-4 Study Guide and Intervention (continued)

Areas of Regular Polygons and Composite Figures

Areas of Composite Figures A composite figure is a figure that can be separated into regions that are basic figures. To find the area of a composite figure, separate the figure into basic figures of which we can find the area. The sum of the areas of the basic figures is the area of the figure.

Example Find the area of the shaded region.



The figure is a rectangle minus one half of a circle. The radius of the circle is one half of 30 or 15.

$$A = lw - \frac{1}{2} \pi r^2$$

$$= 50(30) - 0.5\pi(15)^2$$

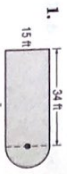
$$\approx 1146.6 \text{ or about } 1147 \text{ ft}^2$$



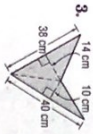
The dimensions of the rectangle are 10 centimeters and 30 centimeters. The area of the shaded region is $(10)(30) - 3\pi(5)^2 = 300 - 75\pi \approx 64.4 \text{ cm}^2$

Exercises

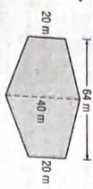
Find the area of each figure. Round to the nearest tenth if necessary.



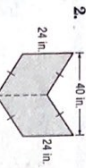
598.4 ft²



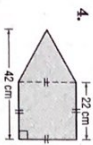
466 cm²



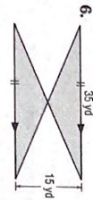
1920 m²



960 in²



704 cm²



262.5 yd²

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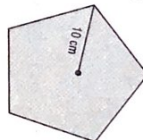
11-4 Skills Practice

Areas of Regular Polygons and Composite Figures

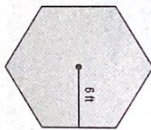
Find the area of each regular polygon. Round to the nearest tenth.



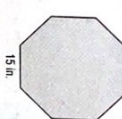
27.7 m²



363.2 cm²

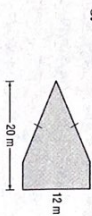


124.7 ft²

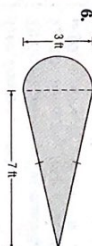


1086.4 in²

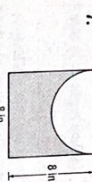
Find the area of each figure. Round to the nearest tenth if necessary.



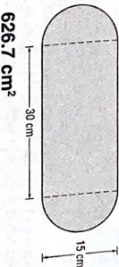
150 m²



14 ft²



38.9 in²



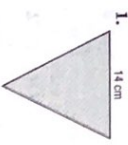
626.7 cm²

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11-4 Practice

Areas of Regular Polygons and Composite Figures

Find the area of each regular polygon. Round to the nearest tenth.



84.9 cm²

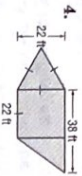


178.0 m²

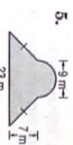
Find the area of each figure. Round to the nearest tenth if necessary.



400 mm²



869.6 ft²

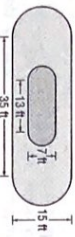


143.8 m²



952.4 in²

7. LANDSCAPING One of the displays at a botanical garden is a koi pond with a walkway around it. The figure shows the dimensions of the pond and the walkway.



- Find the area of the pond to the nearest tenth.
129.5 ft²
- Find the area of the walkway to the nearest tenth.
572.2 ft²

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11-4 World Problem Practice

Areas of Regular Polygons and Composite Figures

1. YIN-YANG SYMBOL A well-known symbol from Chinese culture is the yin-yang symbol, shown below.

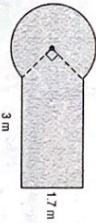


Suppose the large circle has radius r , the small circles have radius $\frac{r}{2}$, and the S-curve is two semicircles, each with radius $\frac{r}{2}$. In terms of r , what is the area of the black region?

$\frac{\pi r^2}{2}$

2. PYRAMIDS Martha's clubhouse is shaped like a square pyramid with four congruent equilateral triangles for its sides. All of the edges are 6 feet long. What is the total surface area of the clubhouse including the floor? Round your answer to the nearest hundredth.
98.35 ft²

3. MINIATURE GOLF The plan for a miniature golf hole is shown below. The right angle in the drawing is a central angle.



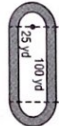
What is the area of the playing surface? Round your answer to the nearest hundredth of a square meter.
9.23 m²

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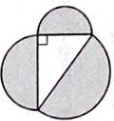
PERIOD _____

Areas of Regular Polygons and Composite Figures

4. TRACK A running track has an inner and outer edge. Both the inner and outer edges consist of two semicircles joined by two straight line segments. The straight line segments are 100 yards long. The radii of the inner edge semicircles are 25 yards each and the radii of the outer edge semicircles are 32 yards each. What is the area of the track? Round your answer to the nearest hundredth of a yard.



5. SEMICIRCLES Bridget arranged three semicircles in the pattern shown.
2653.50 yd²



The right triangle has side lengths 6, 8, and 10 inches.

a. What is the total area of the three semicircles? Round your answer to the nearest hundredth of a square inch.
78.54 in²

b. If the right triangle had side lengths $\sqrt{21}$, $\sqrt{79}$, and 10 inches, what would the total area of the three semicircles be? Round your answer to the nearest hundredth of a square inch.
78.54 in²

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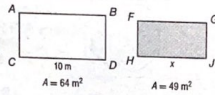
11-5 Study Guide and Intervention (continued)

Areas of Similar Figures

Scale Factors and Missing Measures in Similar Figures You can use the areas of similar figures to find the scale factor between them or a missing measure.

Example If $\square ABCD$ is similar to $\square FGJH$, find the value of x .

Let k be the scale factor between $\square ABCD$ and $\square FGJH$.



$$\frac{\text{area } \square ABCD}{\text{area } \square FGJH} = k^2 \quad \text{Theorem 11.1}$$

$$\frac{64}{49} = k^2 \quad \text{Substitution}$$

$$\frac{8}{7} = k \quad \text{Take the positive square root of each side.}$$

Use this scale factor to find the value of x .

$$\frac{CD}{HJ} = k$$

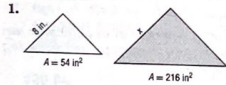
The ratio of corresponding lengths of similar polygons is equal to the scale factor between the polygons.

$$\frac{10}{x} = \frac{8}{7} \quad \text{Substitution}$$

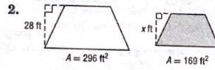
$$x = \frac{7}{8} \cdot 10 \text{ or } 8.75 \quad \text{Multiply each side by 10.}$$

Exercises

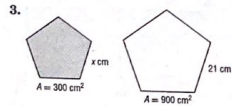
For each pair of similar figures, use the given areas to find the scale factor from the unshaded to the shaded figure. Then find x .



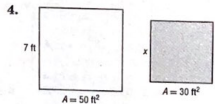
$$k = \frac{1}{2}; x = 16 \text{ in.}$$



$$k = \sqrt{\frac{296}{169}}; x = 21.2 \text{ ft}$$



$$k = \sqrt{3}; x = 12.1$$



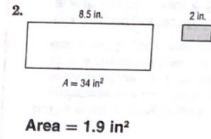
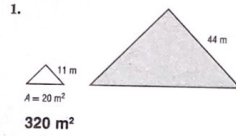
$$k = \sqrt{\frac{5}{3}}; x = 5.4 \text{ ft}$$

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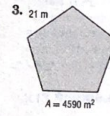
11-5 Skills Practice

Areas of Similar Figures

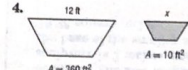
For each pair of similar figures, find the area of the shaded figure.



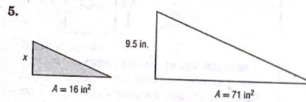
For each pair of similar figures, use the given areas to find the scale factor from the unshaded to the shaded figure. Then find x .



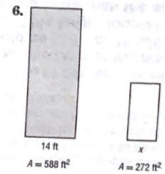
$$\frac{1}{3}; 7 \text{ m}$$



$$6; 2 \text{ ft}$$



$$\sqrt{\frac{71}{16}}; 4.5 \text{ in.}$$



$$\sqrt{\frac{68}{147}}; 9.5 \text{ ft}$$

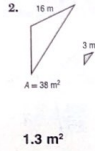
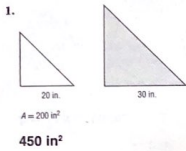
7. **SCIENCE PROJECT** Matt has two posters for his science project. Each poster is a rectangle. The length of the larger poster is 11 inches. The length of the smaller poster is 6 inches. What is the area of the smaller poster if the larger poster is 93.5 square inches?

$$27.8 \text{ in}^2$$

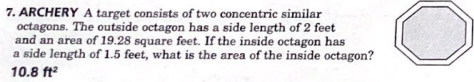
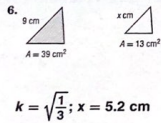
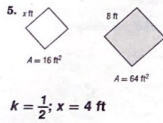
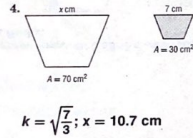
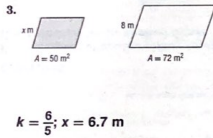
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11-5 Practice
Areas of Similar Figures

For each pair of similar figures, find the area of the shaded figure.



For each pair of similar figures, use the given areas to find the scale factor from the unshaded to the shaded figure. Then find x .

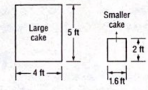


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11-5 Word Problem Practice
Areas of Similar Figures

1. **CHANGING DIMENSIONS** A polygon has an area of 225 square meters. If the area is tripled, how does each side length change?
If the area is tripled, each side length will increase by a factor of $\sqrt{3}$.

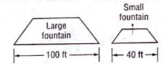
2. **CAKE** Smith's Bakery is baking several large cakes for a community festival. The cakes consist of two geometrically similar shapes as shown. If 50 pieces of cake can be cut from the smaller cake, how many pieces of the same size can be cut from the larger cake? Round to the nearest piece of cake.



313 pieces of cake

3. **PINS** Carla has a shirt with decorative pins in the shape of equilateral triangles. The pins come in two sizes. The larger pin has a side length that is three times longer than the smaller pin. If the area of the smaller pin is 6.9 square centimeters, what is the approximate area of the larger pin?
62.1 cm²

4. **FOUNTAIN** A local park has two fountains in the shape of similar trapezoids as shown.



A cement company charges \$1000 to pour the cement needed to go under the smaller fountain. How much should the town budget for the cement for both fountains? Explain.

The ratio of the lengths of sides is 2.5, so the ratio of the areas should be $(2.5)^2$ or 15,625. The cost of the larger fountain should be times more than the small fountain, or \$15,625. The total cost should be \$15,625.

5. **SCULPTURE** An artist creates metal sculptures in the shape of regular octagons. The side length of the larger sculpture is 7 inches, and the area of the base of the smaller sculpture is 19.28 square inches.

a. What is the side length of the smaller sculpture?
2 inches

b. The artist is going to pack the sculptures in a circular box to take them to an art show. Will the larger sculpture fit in a circular box with a 15-inch diameter? Explain your reasoning.

No, the larger sculpture has an apothem of about 8.5 inches. This means that the octagonal shape of the larger sculpture is about 17 inches across. This is greater than the diameter of the box.