

Study Guide and Review

Study Guide

Key Concepts

Areas of Parallelograms and Triangles (Lesson 11-1)

- The area A of a parallelogram is the product of a base b and its corresponding height h . $A = bh$
- The area A of a triangle is one half the product of a base b and its corresponding height h . $A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$

Areas of Trapezoids, Rhombi, and Kites (Lesson 11-2)

- The area A of a trapezoid is one half the product of the height h and the sum of its bases, b_1 and b_2 .
 $A = \frac{1}{2}h(b_1 + b_2)$
- The area A of a rhombus or kite is one half the product of the lengths of its diagonals, d_1 and d_2 .
 $A = \frac{1}{2}d_1d_2$

Areas of Circles and Sectors (Lesson 11-3)

- The area A of a circle is equal to π times the square of the radius r . $A = \pi r^2$
- The ratio of the area A of a sector to the area of the whole circle, πr^2 , is equal to the ratio of the degree measure of the intercepted arc x to 360.
Proportion: $\frac{A}{\pi r^2} = \frac{x}{360}$ Equation: $A = \frac{x}{360} \cdot \pi r^2$

Areas of Regular Polygons and Composite Figures

(Lesson 11-4)

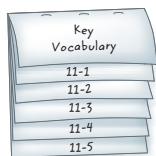
- The area A of a regular n -gon with side length s is one half the product of the apothem a and perimeter P .
 $A = \frac{1}{2}a(ns)$ or $A = \frac{1}{2}aP$

Areas of Similar Figures (Lesson 11-5)

- If two polygons are similar, then their areas are proportional to the square of the scale factor between them.
If $ABCD \sim FGHJ$, then $\frac{\text{area of } FGHJ}{\text{area of } ABCD} = \left(\frac{FG}{AB}\right)^2$.

FOLDABLES® Study Organizer

Be sure the Key Concepts are noted in your Foldable.



Key Vocabulary



- | | |
|---|--------------------------------------|
| apothem (p. 807) | composite figure (p. 809) |
| base of a parallelogram (p. 779) | height of a parallelogram (p. 779) |
| base of a triangle (p. 781) | height of a trapezoid (p. 789) |
| center of a regular polygon (p. 807) | height of a triangle (p. 781) |
| central angle of a regular polygon (p. 807) | radius of a regular polygon (p. 807) |
| | sector of a circle (p. 799) |

Vocabulary Check

State whether each sentence is *true* or *false*. If *false*, replace the underlined term to make a true sentence.

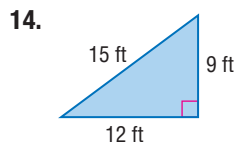
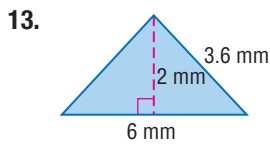
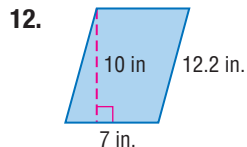
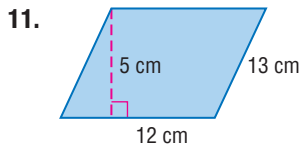
- The center of a trapezoid is the perpendicular distance between the bases.
- A slice of pizza is a sector of a circle.
- The center of a regular polygon is the distance from the middle to the circle circumscribed around the polygon.
- The segment from the center of a square to the corner can be called the radius of the square.
- A segment drawn perpendicular to a side of a regular polygon is called an apothem of the polygon.
- The measure of each radial angle of a regular n -gon is $\frac{360}{n}$.
- The apothem of a polygon is the perpendicular distance between any two parallel bases.
- The height of a triangle is the length of an altitude drawn to a given base.
- Any side of a parallelogram can be called the height of a parallelogram.
- The center of a regular polygon is also the center of its circumscribed circle.



Lesson-by-Lesson Review

11-1 Areas of Parallelograms and Triangles

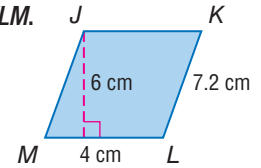
Find the perimeter and area of each parallelogram or triangle. Round to the nearest tenth if necessary.



15. **PAINTING** Two of the walls of an attic in an A-frame house are triangular, each with a height of 12 feet and a width of 22 feet. How much paint is needed to paint one end of the attic?

Example 1

Find the perimeter and area of $\square JKLM$.



Perimeter

$$\begin{aligned} \text{Perimeter of } \square JKLM &= JK + KL + LM + JM \\ &= 4 + 7.2 + 4 + 7.2 \text{ or } 22.4 \text{ cm} \end{aligned}$$

Area

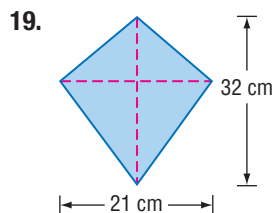
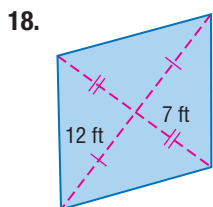
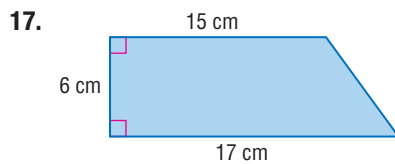
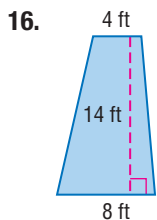
$$\begin{aligned} A &= bh \\ &= (4)(6) \text{ or } 24 \text{ cm}^2 \end{aligned}$$

Area of a parallelogram

$$b = 4 \text{ and } h = 6$$

11-2 Areas of Trapezoids, Rhombi, and Kites

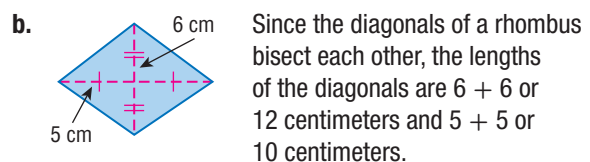
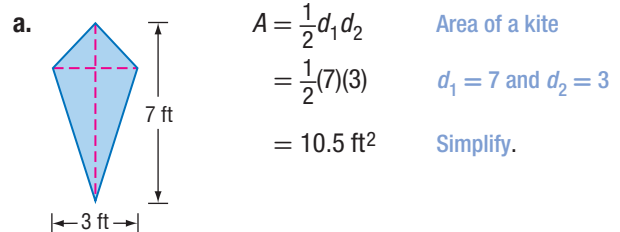
Find the area of each trapezoid, rhombus, or kite.



20. **KITES** Team Dragon's kite is 4 feet long and 3 feet across. How much fabric does it take to make their kite?

Example 2

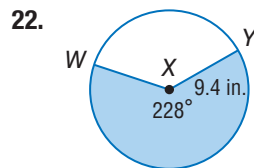
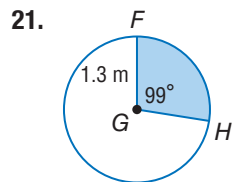
Find the area of each rhombus or kite.



$$\begin{aligned} A &= \frac{1}{2}d_1d_2 && \text{Area of a rhombus} \\ &= \frac{1}{2}(10)(12) && d_1 = 10 \text{ and } d_2 = 12 \\ &= 60 \text{ cm}^2 && \text{Simplify.} \end{aligned}$$

11-3 Areas of Circles and Sectors

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

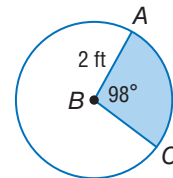


23. **BICYCLES** A bicycle tire decoration covers $\frac{1}{9}$ of the circle formed by the tire. If the tire has a diameter of 26 inches, what is the area of the decoration?

24. **PIZZA** Charlie and Kris ordered a 16-inch pizza and cut the pizza into 12 slices.
- If Charlie ate 3 pieces, what area of the pizza did he eat?
 - If Kris ate 2 pieces, what area of the pizza did she eat?
 - What is the area of leftover pizza?

Example 3

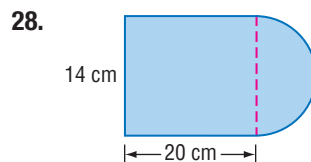
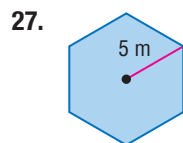
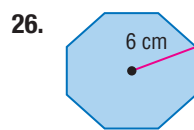
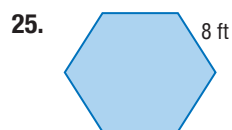
Find the area of the shaded sector. Round to the nearest tenth.



$$\begin{aligned} A &= \frac{x}{360} \cdot \pi r^2 && \text{Area of a sector} \\ &= \frac{98}{360} \cdot \pi(2)^2 && \text{Substitution} \\ &\approx 3.4 \text{ ft}^2 && \text{Simplify.} \end{aligned}$$

11-4 Areas of Regular Polygons and Composite Figures

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

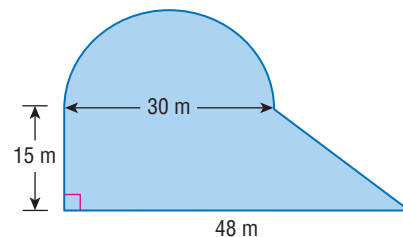


29. **SIGNS** Find the area of the stop sign below in square inches.



Example 4

Find the area of the figure.



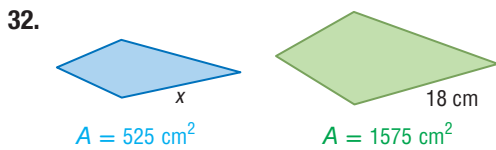
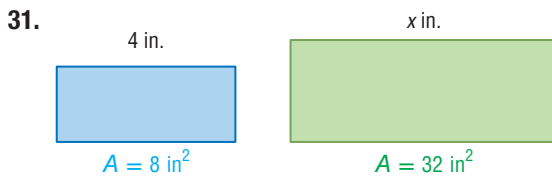
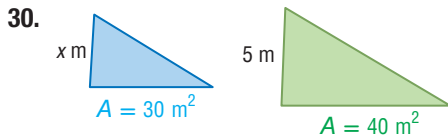
The composite shape is made up of a semicircle and a trapezoid.

$$\begin{aligned} \text{Area} &= \text{Area of semicircle} + \text{Area of trapezoid} \\ &= \frac{180}{360} \cdot \pi \cdot r^2 + \frac{1}{2} \cdot h \cdot (b_1 + b_2) \\ &\approx \frac{180}{360} \cdot \pi \cdot 15^2 + \frac{1}{2} \cdot 15 \cdot (30 + 48) \\ &\approx 112.5\pi + 585 \text{ or about } 938.4 \text{ m}^2 \end{aligned}$$

Study Guide and Review *Continued*

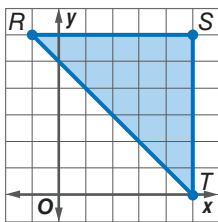
11-5 Areas of Similar Figures

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

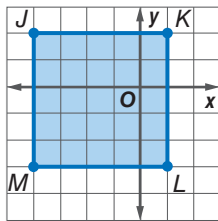


COORDINATE GEOMETRY Find the area of each figure. Use the segment length given to find the area of a similar polygon.

33. $R'S' = 3$



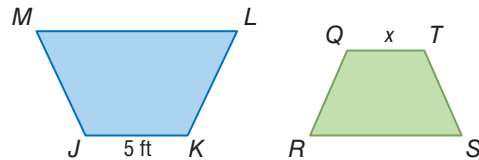
34. $KL' = 15$



35. **LAND OWNERSHIP** Joshua's land is 600 square miles. A map of his land is 5 square feet. If one side of the map is 1.5 feet, how long is the corresponding side of the land?

Example 5

The area of trapezoid $JKLM$ is 138 square feet. The area of trapezoid $QRST$ is 5.52 square feet. If trapezoid $JKLM \sim$ trapezoid $QRST$, find the scale factor from trapezoid $JKLM$ to trapezoid $QRST$ and the value of x .



Let k be the scale factor between trapezoid $JKLM$ and trapezoid $QRST$.

$$\frac{\text{Area of trapezoid } JKLM}{\text{Area of trapezoid } QRST} = k^2 \quad \text{Theorem 11.1}$$

$$\frac{138}{5.52} = k^2 \quad \text{Substitution}$$

$$5 = k \quad \text{Take the positive square root of each side.}$$

So, the scale factor from trapezoid $JKLM$ to trapezoid $QRST$ is 5. Use this scale factor to find the value of x .

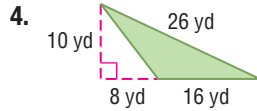
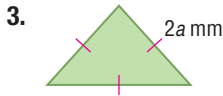
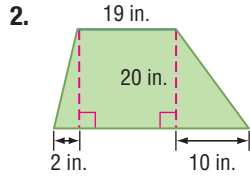
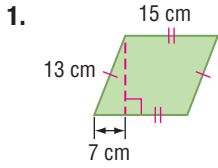
$$\frac{JK}{QT} = k \quad \text{The ratio of corresponding lengths of similar polygons is equal to the scale factor between the polygons.}$$

$$\frac{5}{x} = 5 \quad \text{Substitution}$$

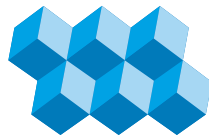
$$1 = x \quad \text{Simplify.}$$

Practice Test

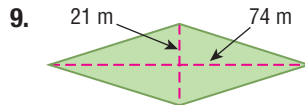
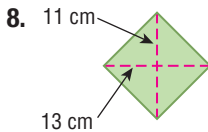
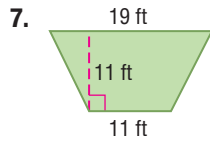
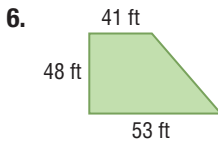
Find the area and perimeter of each figure. Round to the nearest tenth if necessary.



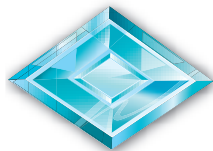
5. **ARCHAEOLOGY** The tile pattern shown was used in Pompeii for paving. If the diagonals of each rhombus are 2 and 3 inches, what area makes up each “cube” in the pattern?



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



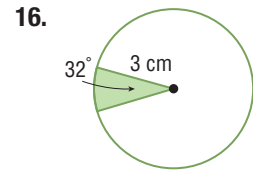
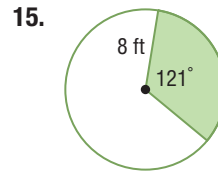
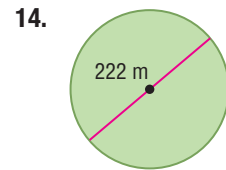
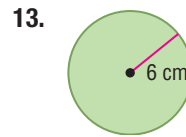
10. **GEMOLOGY** A gem is cut in a kite shape. It is 6.2 millimeters wide at its widest point and 5 millimeters long. What is the area?



11. **ALGEBRA** The area of a triangle is 16 square units. The base of the triangle is $x + 4$ and the height is x . Find x .

12. **ASTRONOMY** A large planetarium in the shape of a dome is being built. When it is complete, the base of the dome will have a circumference of 870 meters. How many square meters of land were required for this planetarium?

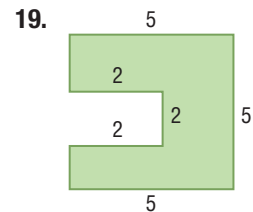
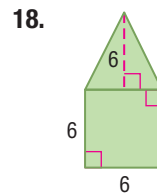
Find the area of each circle or sector. Round to the nearest tenth.



17. **MURALS** An artisan is creating a circular street mural for an art festival. The mural is going to be 50 feet wide.

- Find the area of the mural to the nearest square foot.
- One sector of the mural spans 38° . What is the area of this sector to the nearest square foot?

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

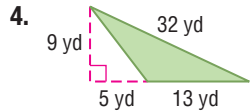
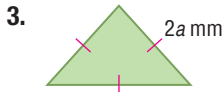
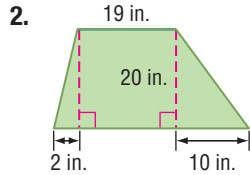
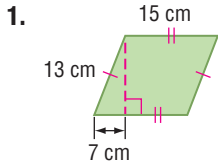


20. **BAKING** Todd wants to make a cheesecake for a birthday party. The recipe calls for a 9-inch diameter round pan. Todd only has square pans. He has an 8-inch square pan, a 9-inch square pan, and a 10-inch square pan. Which pan comes closest in area to the one that the recipe suggests?

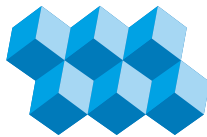


Practice Test

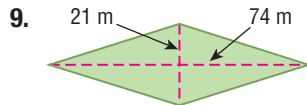
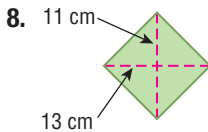
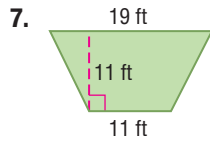
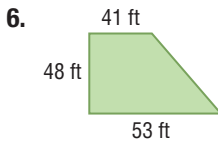
Find the area and perimeter of each figure. Round to the nearest tenth if necessary.



5. **ARCHAEOLOGY** The tile pattern shown was used in Pompeii for paving. If the diagonals of each rhombus are 2 and 3 inches, what area makes up each “cube” in the pattern?



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



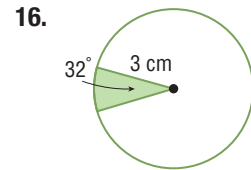
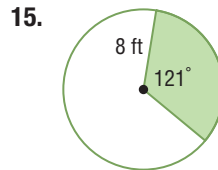
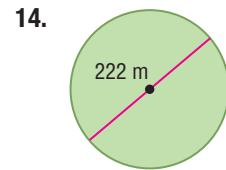
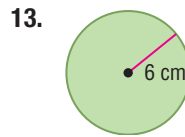
10. **GEMOLOGY** A gem is cut in a kite shape. It is 6.2 millimeters wide at its widest point and 5 millimeters long. What is the area?



11. **ALGEBRA** The area of a triangle is 16 square units. The base of the triangle is $x + 4$ and the height is x . Find x .

12. **ASTRONOMY** A large planetarium in the shape of a dome is being built. When it is complete, the base of the dome will have a circumference of 870 meters. How many square meters of land were required for this planetarium?

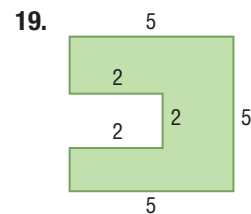
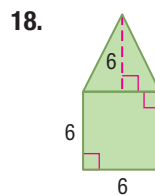
Find the area of each circle or sector. Round to the nearest tenth.



17. **MURALS** An artisan is creating a circular street mural for an art festival. The mural is going to be 50 feet wide.

- Find the area of the mural to the nearest square foot.
- One sector of the mural spans 38° . What is the area of this sector to the nearest square foot?

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



20. **BAKING** Todd wants to make a cheesecake for a birthday party. The recipe calls for a 9-inch diameter round pan. Todd only has square pans. He has an 8-inch square pan, a 9-inch square pan, and a 10-inch square pan. Which pan comes closest in area to the one that the recipe suggests?

