

Area of Composite Figures



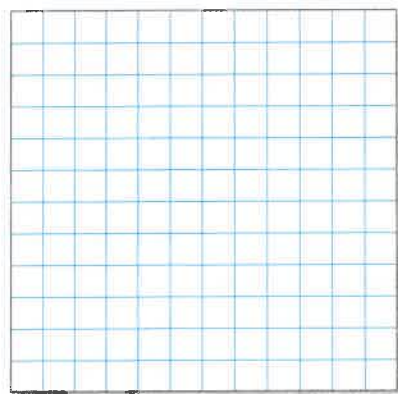
Real-World Link

Stained Glass Windows An image of a stained glass window is shown below.

1. Identify two of the shapes that make up the window.

2. How could you find the area of the entire window except for the shapes you identified in Exercise 1?

3. Draw a figure that is made up of a triangle and a rectangle on the grid below. Then find the area of your figure by counting square units.



Area: _____ square units



Essential Question

HOW do measurements help you describe real-world objects?



Vocabulary

composite figure



Common Core State Standards

Content Standards
7.G.4, 7.G.6

MP Mathematical Practices
1, 2, 3, 4



Which **MP Mathematical Practices** did you use?

Shade the circle(s) that applies.

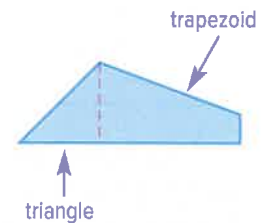
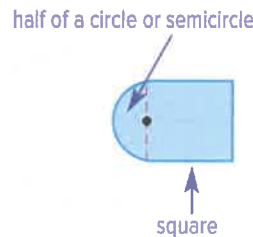
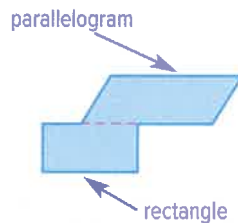
- | | |
|--|---|
| <input type="checkbox"/> 1 Persevere with Problems | <input type="checkbox"/> 5 Use Math Tools |
| <input type="checkbox"/> 2 Reason Abstractly | <input type="checkbox"/> 6 Attend to Precision |
| <input type="checkbox"/> 3 Construct an Argument | <input type="checkbox"/> 7 Make Use of Structure |
| <input type="checkbox"/> 4 Model with Mathematics | <input type="checkbox"/> 8 Use Repeated Reasoning |

Find the Area of a Composite Figure

A **composite figure** is made up of two or more shapes.

To find the area of a composite figure, decompose the figure into shapes with areas you know. Then find the sum of these areas.

Shape	Words	Formula
Parallelogram	The area A of a parallelogram is the product of any base b and its height h .	$A = bh$
Triangle	The area A of a triangle is half the product of any base b and its height h .	$A = \frac{1}{2}bh$
Trapezoid	The area A of a trapezoid is half the product of the height h and the sum of the bases, b_1 and b_2 .	$A = \frac{1}{2}h(b_1 + b_2)$
Circle	The area A of a circle is equal to π times the square of the radius r .	$A = \pi r^2$

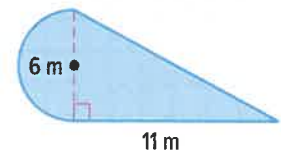


Example



1. Find the area of the composite figure.

The figure can be separated into a semicircle and a triangle.



Area of semicircle

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

$$A \approx \frac{1}{2} \cdot 3.14 \cdot 6^2$$

$$A \approx 14.1$$

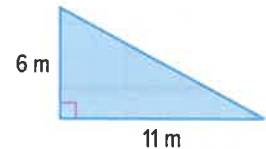


Area of triangle

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \cdot 11 \cdot 6$$

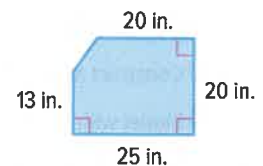
$$A = 33$$



The area of the figure is about $14.1 + 33$ or 47.1 square meters.

Got it? Do this problem to find out.

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



Show your work.

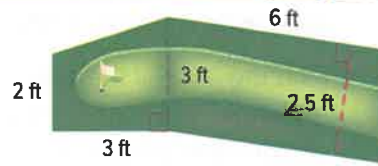
a. _____



Example



- 2.** A miniature golf hole is composed of a trapezoid and a parallelogram. How many square feet of turf does the hole cover?

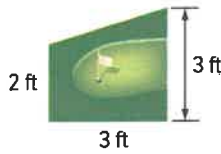


Area of trapezoid

$$A = \frac{1}{2}h(b_1 + b_2)$$

$$A = \frac{1}{2}(3)(2 + 6)$$

$$A = 7.5$$

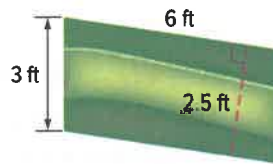


Area of parallelogram

$$A = bh$$

$$A = 6 \cdot 2.5$$

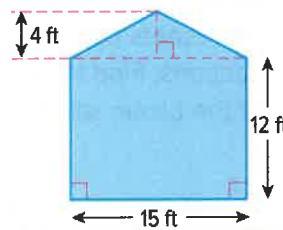
$$A = 15$$



So, $7.5 + 15$ or 22.5 square feet of turf will be needed.

Got it? Do this problem to find out.

- b.** Pedro's father is building a shed. How many square feet of wood are needed to build the back of the shed shown at the right?



Show your work.

b. _____

Find the Area of a Shaded Region

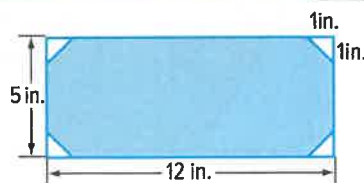
Use the areas you know to find the area of a shaded region.

Examples



- 3.** Find the area of the shaded region.

Find the area of the rectangle and subtract the area of the four congruent triangles.



Area of rectangle

$$A = \ell w$$

$$A = 12 \cdot 5 \quad \ell = 12, w = 5$$

$$A = 60 \quad \text{Simplify.}$$

Area of triangles

$$A = 4 \cdot \left(\frac{1}{2}bh\right)$$

$$A = 4 \cdot \frac{1}{2} \cdot 1 \cdot 1 \quad b = 1, h = 1$$

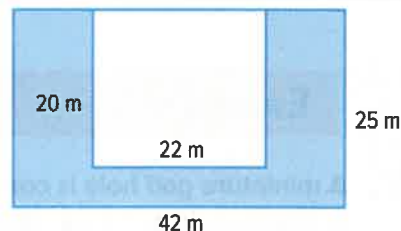
$$A = 2 \quad \text{Simplify.}$$

The area of the shaded region is $60 - 2$ or 58 square inches.

Congruent Triangles

Congruent triangles have corresponding sides and angles that are congruent.

4. The blueprint for a hotel swimming area is represented by the figure shown. The shaded area represents the pool. Find the area of the pool.



Find the area of the entire rectangle and subtract the section that is not shaded.

Area of the entire rectangle

$$A = \ell w$$

$$A = 42 \cdot 25 \text{ or } 1,050$$

The area of the shaded region is $1,050 - 440$ or 610 square meters.

Area not shaded

$$A = \ell w$$

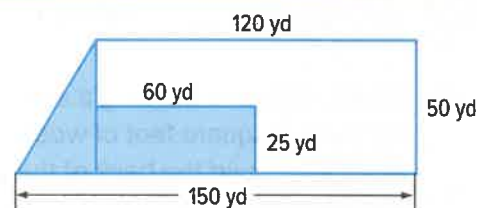
$$A = 22 \cdot 20 \text{ or } 440$$

Show your work.

c. _____

Got it? Do this problem to find out.

- c. A diagram for a park is shown. The shaded area represents the picnic sections. Find the area of the picnic sections.



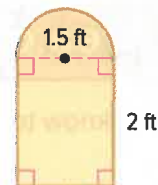
Guided Practice



1. Mike installed the window shown. How many square feet is the window? Round to the nearest tenth. Use 3.14 for π .

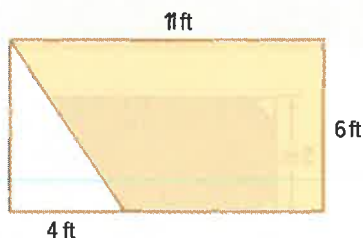
Show your work.

(Examples 1 and 2)



2. A triangle is cut from a rectangle. Find the area of the shaded region.

(Examples 3 and 4)



3. **Building on the Essential Question** Is your answer to Exercise 1 an exact or approximate answer? Explain.

Rate Yourself!

How confident are you about finding the area of composite figures? Check the box that applies.



For more help, go online to access a Personal Tutor.

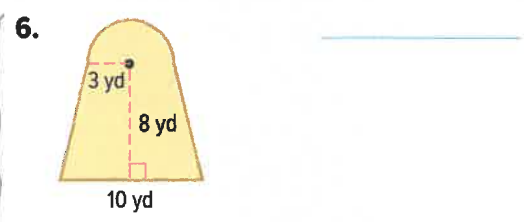
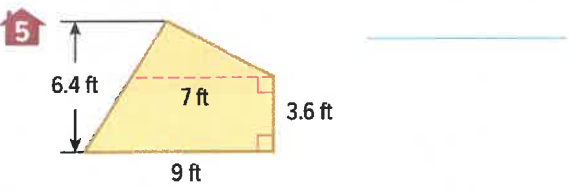
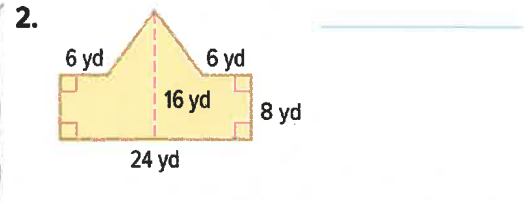
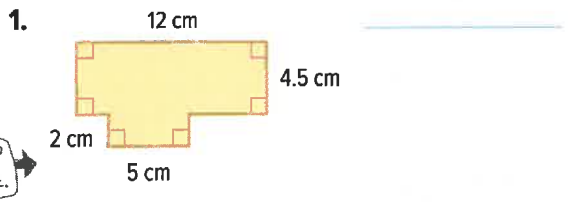


Independent Practice

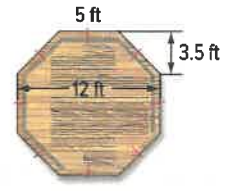
Go online for Step-by-Step Solutions



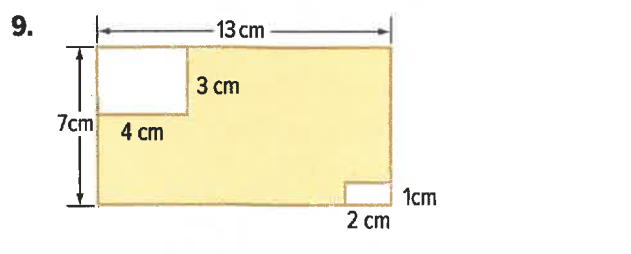
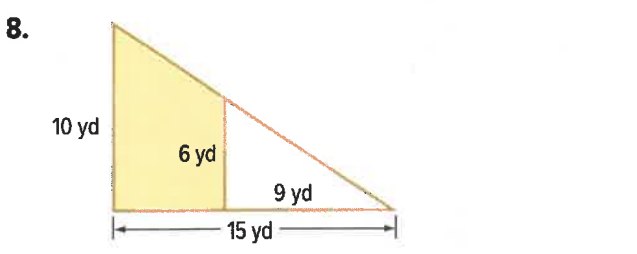
Find the area of each figure. Round to the nearest tenth if necessary. (Example 1)



7 Daniel is constructing a deck like the one shown. What is the area of the deck? (Example 2)

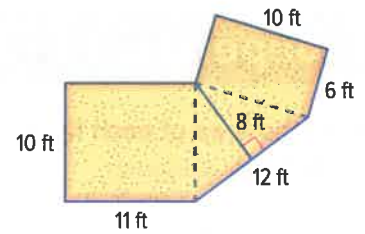


Find the area of the shaded region. Round to the nearest tenth if necessary. (Examples 3 and 4)



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10. **MP Persevere with Problems** Zoe's mom is carpeting her bedroom and needs to know the amount of floor space. How many square feet of carpeting are needed for the room? If she is also installing baseboards on the bottom of all the walls, how many feet of baseboards are needed? _____

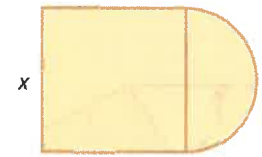


H.O.T. Problems Higher Order Thinking

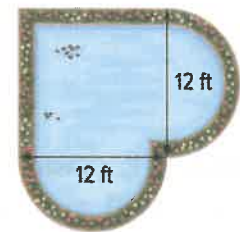
11. **MP Persevere with Problems** The composite figure shown is made from a rectangle and part of a circle. Find the approximate area and perimeter of the entire figure. Round to the nearest tenth.



12. **MP Reason Abstractly** The side length of the square in the figure at the right is x units. Write expressions that represent the perimeter and area of the figure.



13. **MP Persevere with Problems** In the diagram shown at the right, a 2-foot-wide flower border surrounds the heart-shaped pond. What is the area of the border?



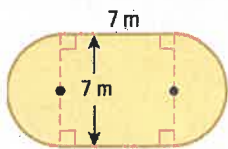
14. **MP Model with Mathematics** Find a real-world object that is a composite figure. Measure the dimensions of the figure. Draw a model of the figure with appropriate labels. Then find the area of the composite figure. _____



Extra Practice

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

15.



87.5 m²

Homework Help

Area of circle

$$A = \pi r^2$$

$$A = 3.14 \cdot 3.5^2 \text{ or } 38.5$$

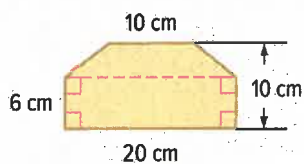
$$38.5 + 49 = 87.5$$

Area of square

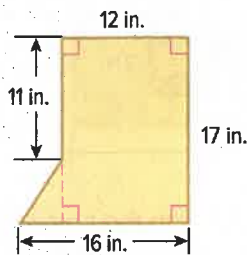
$$A = lw$$

$$A = 7 \cdot 7 \text{ or } 49$$

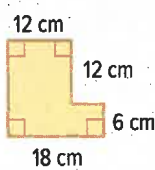
17.



16.



18.

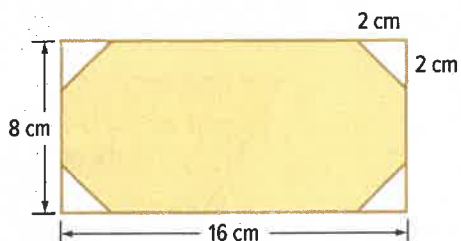


19. A necklace comes with a gold pendant. What is the area of the pendant in square centimeters? _____

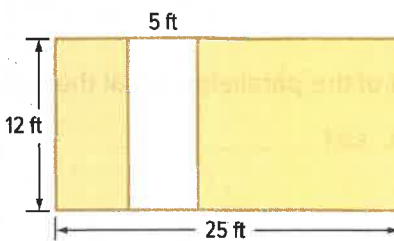


Find the area of the shaded region. Round to the nearest tenth if necessary.

20.



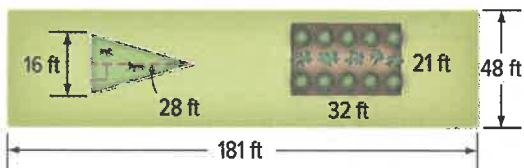
21.





Power Up! Common Core Test Practice

22. The Patel's backyard has a rectangular vegetable garden and a triangular pet exercise area.



Match each part of the yard with the correct area.

Pet Exercise Area: ft^2

Vegetable Garden Area: ft^2

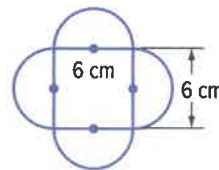
Total Backyard Area: ft^2

106	672
224	1,092
458	7,520
544	8,688

How much of the backyard is not being used for the vegetable garden or pet exercise area?

23. The figure is made up of a square and four semicircles. Fill in each box to complete each statement. Round to the nearest hundredth.

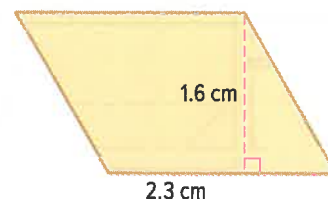
- a. The area of the square is cm^2 .
- b. The area of each semicircle is about cm^2 .
- c. The total area of the figure is about cm^2 .



Common Core Spiral Review

24. What is the area of a triangle with a base of 52 feet and a height of 38 feet? **6.G.1** _____

25. Find the area of the parallelogram at the right. Round to the nearest tenth. **6.G.1** _____



26. Find the height of a parallelogram with an area of 104 square yards and a base of 8 yards. **6.G.1**
- _____

27. Find the base of a parallelogram with a height of 3.2 meters and an area of 15.04 square meters. **6.G.1**
- _____