8.4 Areas of Composite Figures

Essential Question How can you find the area of a composite figure?

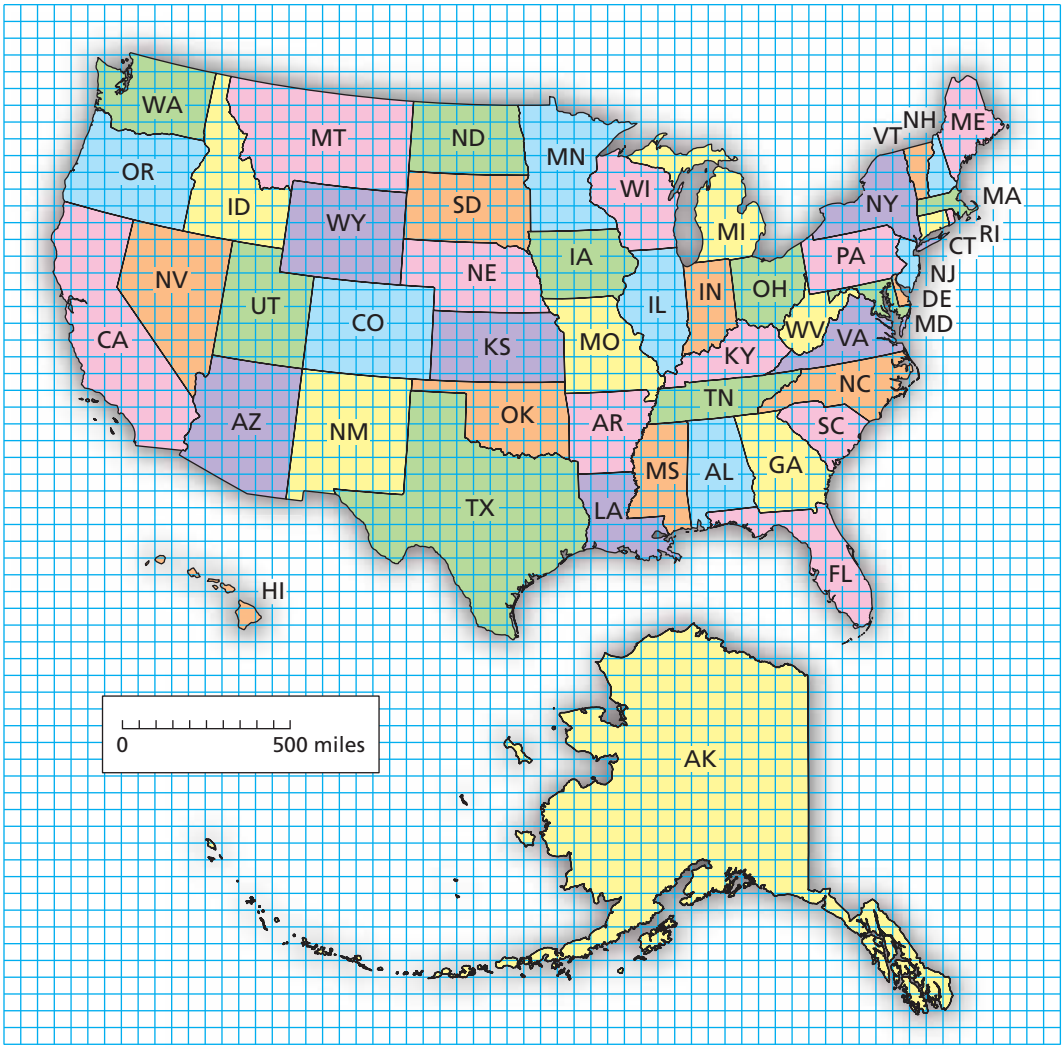
1 ACTIVITY: Estimating Area

Work with a partner.

a. Choose a state. On grid paper, draw a larger outline of the state.

b. Use your drawing to estimate the area (in square miles) of the state.

c. Which state areas are easy to find? Which are difficult? Why?

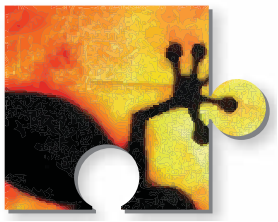


Geometry

In this lesson, you will

- find areas of composite figures by separating them into familiar figures.
- solve real-life problems.

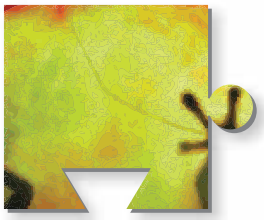
2 ACTIVITY: Estimating Areas

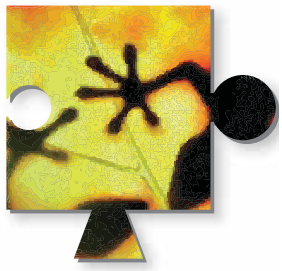


Work with a partner. The completed puzzle has an area of 150 square centimeters.

a. Estimate the area of each puzzle piece.

b. Check your work by adding the six areas. Why is this a check?





3 ACTIVITY: Filling a Square with Circles

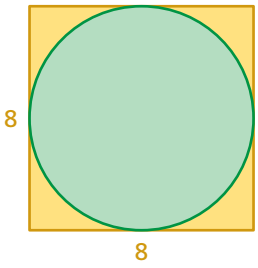
Math Practice

Make a Plan

What steps will you use to solve this problem?

Work with a partner. Which pattern fills more of the square with circles? Explain.

a.



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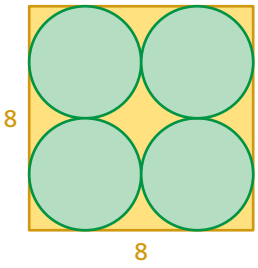
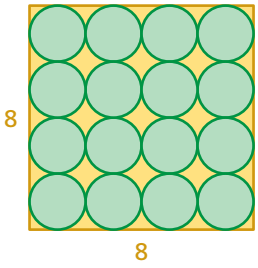
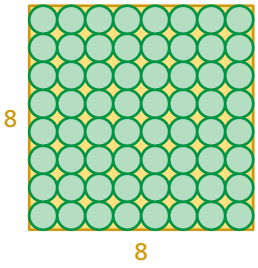


c.



d.



What Is Your Answer?

4. IN YOUR OWN WORDS How can you find the area of a composite figure?

5. Summarize the area formulas for all the basic figures you have studied. Draw a single composite figure that has each type of basic figure. Label the dimensions and find the total area.

Practice Use what you learned about areas of composite figures to complete Exercises 3–5 on page 342.

8.4 Lesson

Check It Out
Lesson Tutorials
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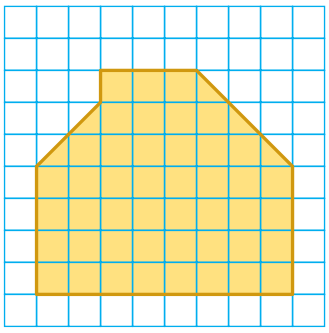
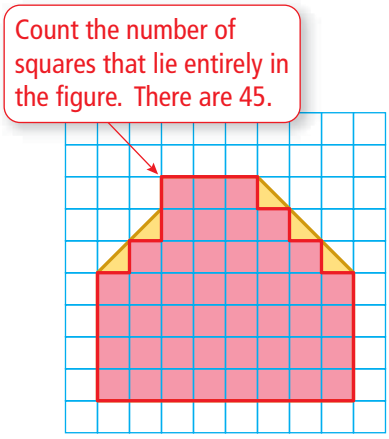
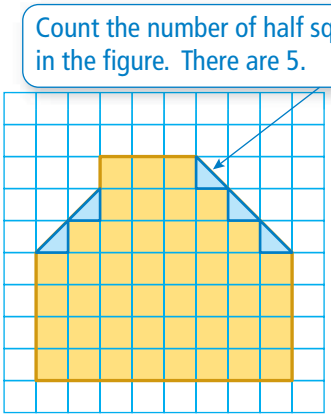
To find the area of a composite figure, separate it into figures with areas you know how to find. Then find the sum of the areas of those figures.

EXAMPLE 1 Finding an Area Using Grid Paper

Find the area of the yellow figure.







The area of a half square is $1 \div 2 = 0.5$ square unit.

Area of 45 squares: $45 \times 1 = 45$ square units

Area of 5 half squares: $5 \times 0.5 = 2.5$ square units

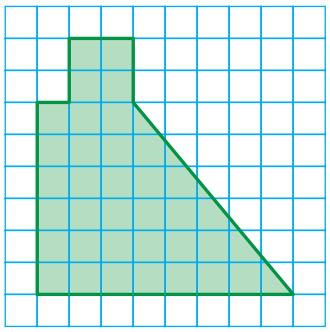
∴ So, the area is $45 + 2.5 = 47.5$ square units.

On Your Own

Now You're Ready
Exercises 3–8

Find the area of the shaded figure.

1.



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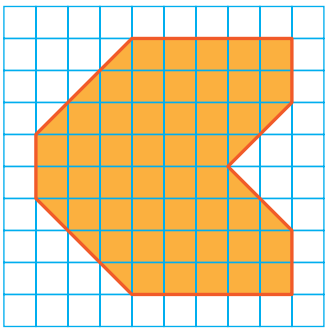
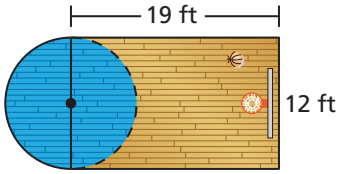


EXAMPLE 2 Finding an Area

Find the area of the portion of the basketball court shown.

The figure is made up of a rectangle and a semicircle. Find the area of each figure.



Area of Rectangle

$$A = \ell w$$
$$= 19(12)$$
$$= 228$$

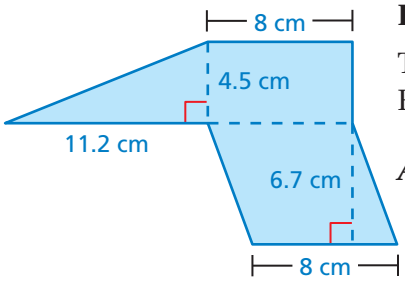
Area of Semicircle

$$A = \frac{\pi r^2}{2}$$
$$\approx \frac{3.14 \cdot 6^2}{2}$$
$$= 56.52$$

The semicircle has a radius of $\frac{12}{2} = 6$ feet.

∴ So, the area is about $228 + 56.52 = 284.52$ square feet.

EXAMPLE 3 Finding an Area



Find the area of the figure.

The figure is made up of a triangle, a rectangle, and a parallelogram. Find the area of each figure.

Area of Triangle

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2}(11.2)(4.5)$$
$$= 25.2$$

Area of Rectangle

$$A = \ell w$$
$$= 8(4.5)$$
$$= 36$$

Area of Parallelogram

$$A = bh$$
$$= 8(6.7)$$
$$= 53.6$$

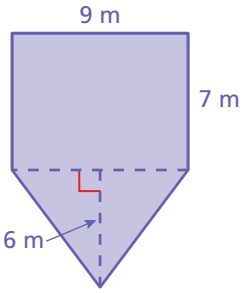
∴ So, the area is $25.2 + 36 + 53.6 = 114.8$ square centimeters.

On Your Own

Now You're Ready
Exercises 9 and 10

Find the area of the figure.

3.



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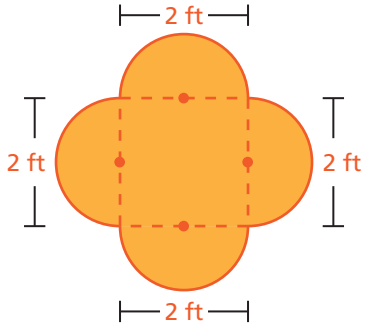

8.4 Exercises

Check It Out
Help with Homework
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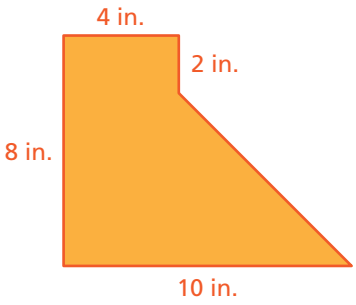
Vocabulary and Concept Check

1. **REASONING** Describe two different ways to find the area of the figure. Name the types of figures you used and the dimensions of each.

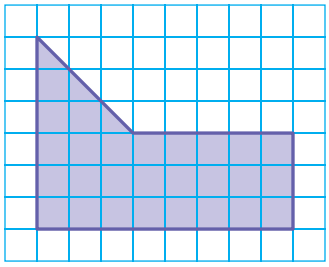
2. **REASONING** Draw a trapezoid. Explain how you can think of the trapezoid as a composite figure to find its area.



Practice and Problem Solving

Find the area of the figure.

1 3.



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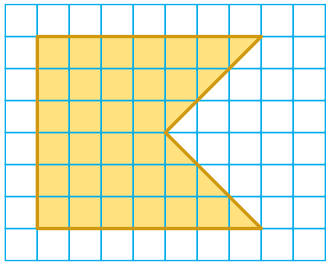

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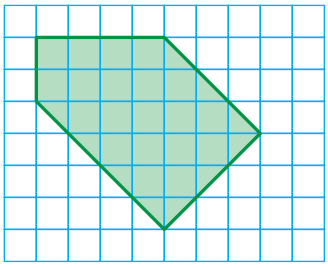

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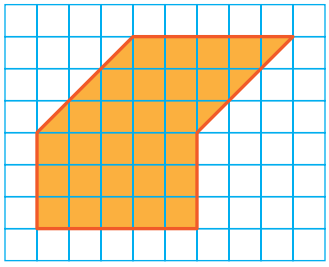

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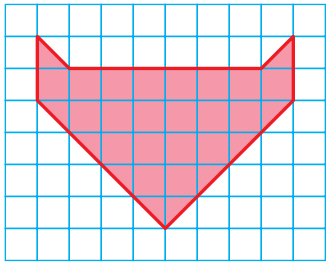

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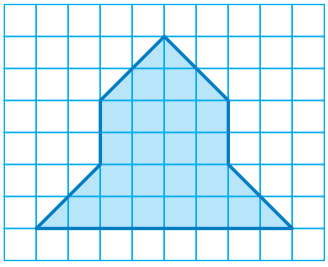
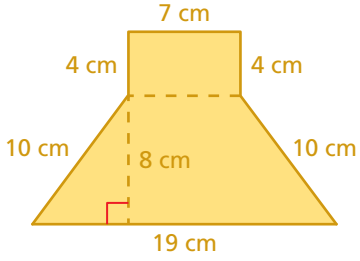


Find the area of the figure.

2 3 9.



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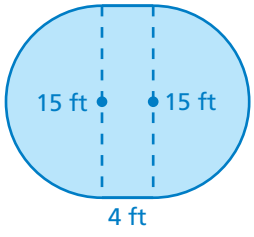
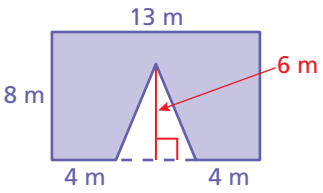


11. **OPEN-ENDED** Trace your hand and your foot on grid paper. Then estimate the area of each. Which one has the greater area?

Find the area of the figure.

12.



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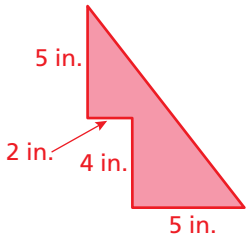

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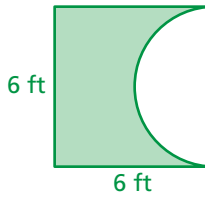
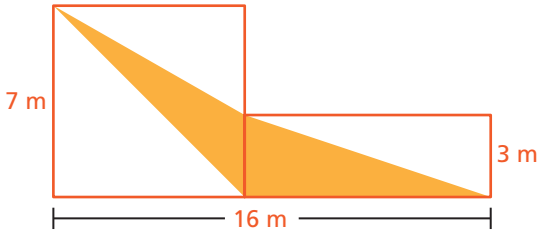
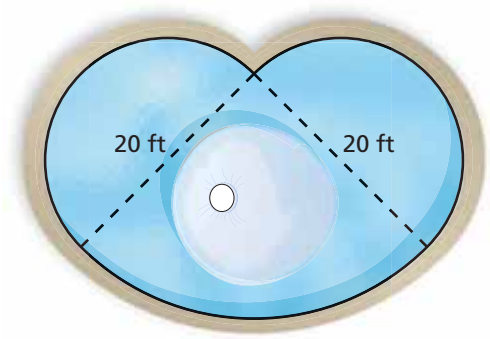


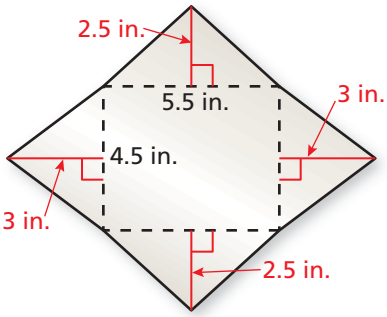
15. **STRUCTURE** The figure is made up of a square and a rectangle. Find the area of the shaded region.

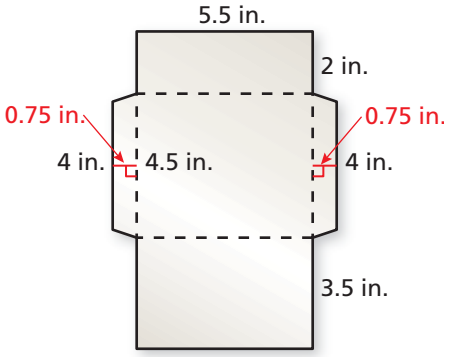




16. **FOUNTAIN** The fountain is made up of two semicircles and a quarter circle. Find the perimeter and the area of the fountain.

17. Critical Thinking You are deciding on two different designs for envelopes.





a. Which design has the greater area?

b. You make 500 envelopes using the design with the greater area. Using the same amount of paper, how many more envelopes can you make with the other design?

Fair Game Review What you learned in previous grades & lessons

Write the phrase as an expression. *(Skills Review Handbook)*

18. 12 less than a number x

19. a number y divided by 6

20. a number b increased by 3

21. the product of 7 and a number w

22. **MULTIPLE CHOICE** What number is 0.02% of 50? *(Section 6.4)*

Ⓐ 0.01 Ⓑ 0.1 Ⓒ 1 Ⓓ 100