8.2 Perimeters of Composite Figures

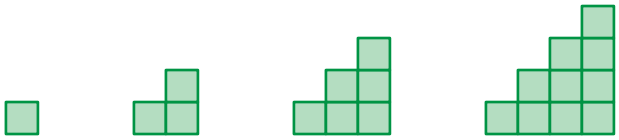
Essential Question How can you find the perimeter of a composite figure?

1 ACTIVITY: Finding a Pattern

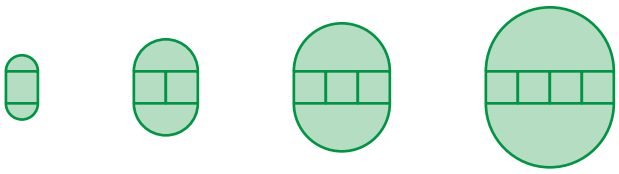
Work with a partner. Describe the pattern of the perimeters. Use your pattern to find the perimeter of the tenth figure in the sequence. (Each small square has a perimeter of 4.)

a.

b.



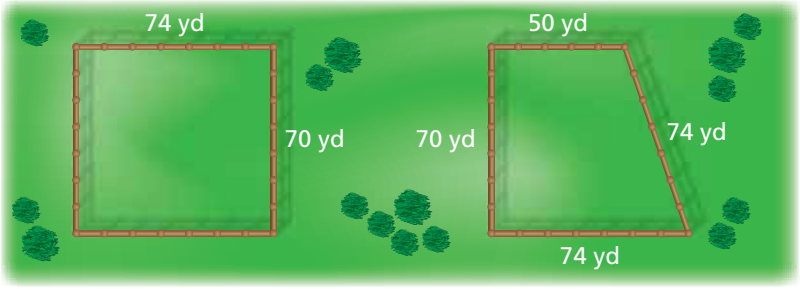
c.



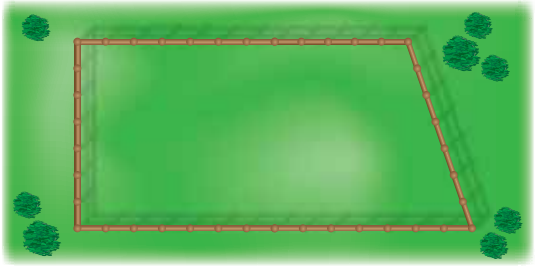
2 ACTIVITY: Combining Figures

Work with a partner.

a. A rancher is constructing a rectangular corral and a trapezoidal corral, as shown. How much fencing does the rancher need to construct both corrals?



b. Another rancher is constructing one corral by combining the two corrals above, as shown. Does this rancher need more or less fencing? Explain your reasoning.



c. How can the rancher in part (b) combine the two corrals to use even less fencing?

Geometry

In this lesson, you will

- find perimeters of composite figures.

3 ACTIVITY: Submitting a Bid

Work with a partner. You want to bid on a tiling contract. You will be supplying and installing the brown tile that borders the swimming pool. In the figure, each grid square represents 1 square foot.

- **Your cost for the tile is $4 per linear foot.**
- **It takes about 15 minutes to prepare, install, and clean each foot of tile.**

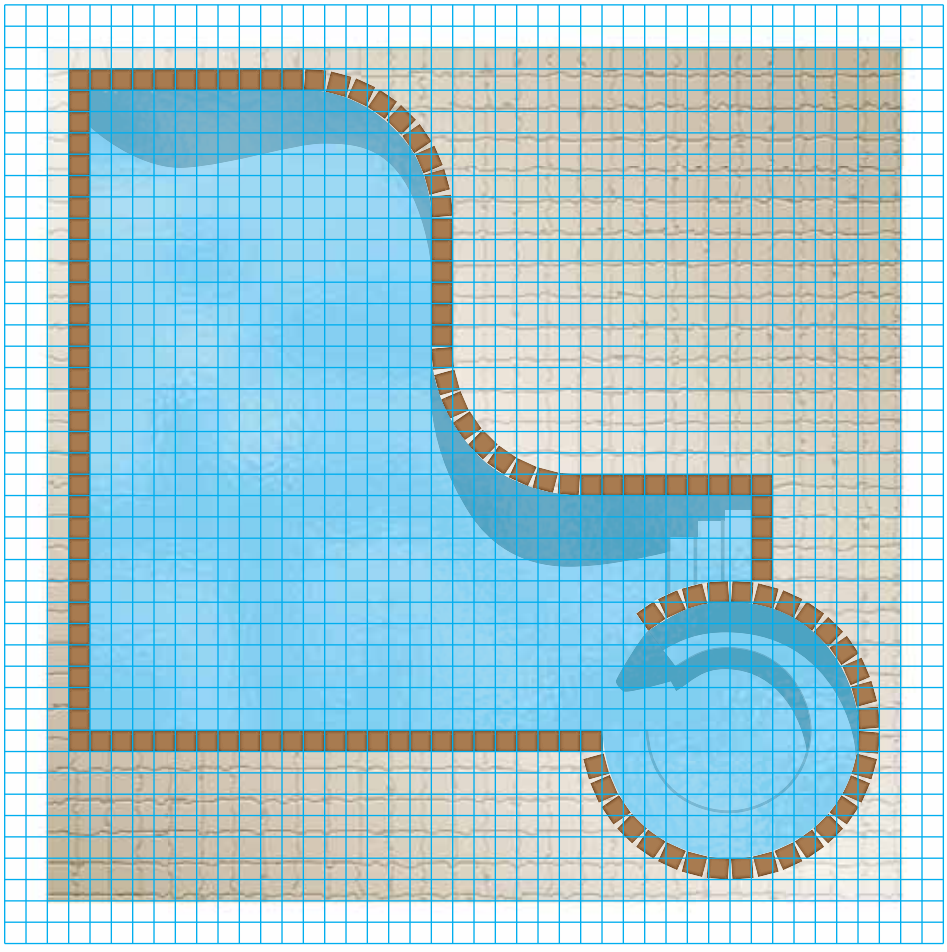
a. How many brown tiles do you need for the border?

b. Write a bid for how much you will charge to supply and install the tile. Include what you want to charge as an hourly wage. Estimate what you think your profit will be.

Math Practice

Communicate Precisely

What do you need to include to create an accurate bid? Explain.



What Is Your Answer?

4. IN YOUR OWN WORDS How can you find the perimeter of a composite figure? Use a semicircle, a triangle, and a parallelogram to draw a composite figure. Label the dimensions. Find the perimeter of the figure.

Practice Use what you learned about perimeters of composite figures to complete Exercises 3–5 on page 328.

8.2 Lesson

Check It Out
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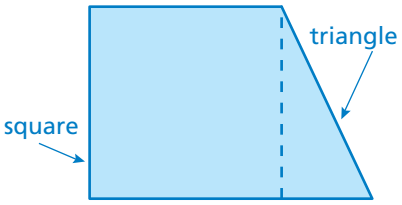
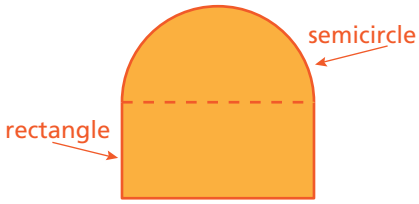
Key Vocabulary
composite figure, *p. 326*

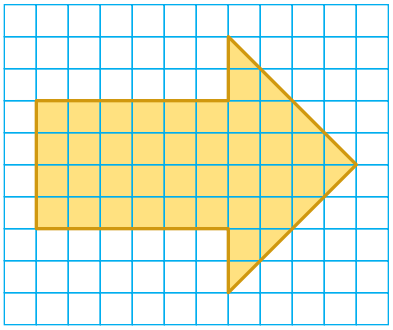
A **composite figure** is made up of triangles, squares, rectangles, semicircles, and other two-dimensional figures. Here are two examples.



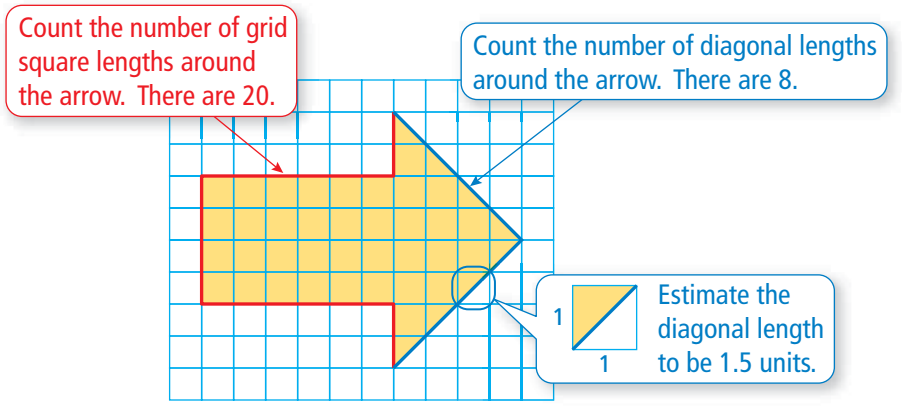


To find the perimeter of a composite figure, find the distance around the figure.

EXAMPLE 1 Estimating a Perimeter Using Grid Paper



Estimate the perimeter of the arrow.



Length of 20 grid square lengths: $20 \times 1 = 20$ units

Length of 8 diagonal lengths: $8 \times 1.5 = 12$ units

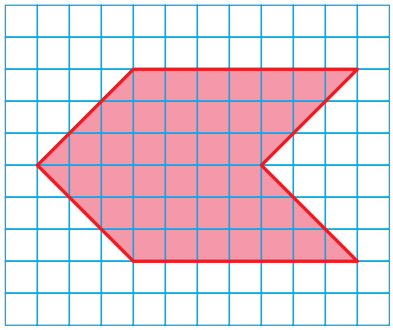
∴ So, the perimeter is about $20 + 12 = 32$ units.

On Your Own

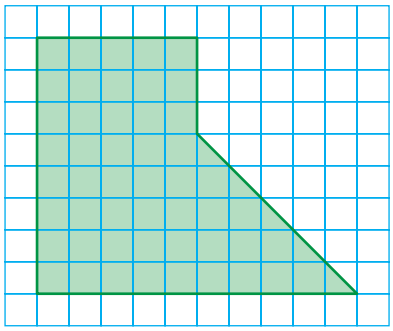
Now You're Ready
Exercises 3–8

Estimate the perimeter of the figure.

1.



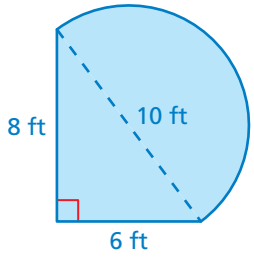
2.



Multi-Language Glossary at BigIdeasMath.com

EXAMPLE 2 Finding a Perimeter

The figure is made up of a semicircle and a triangle. Find the perimeter.



The distance around the triangular part of the figure is $6 + 8 = 14$ feet.

The distance around the semicircle is one-half the circumference of a circle with a diameter of 10 feet.

$$\frac{C}{2} = \frac{\pi d}{2}$$ Divide the circumference by 2.

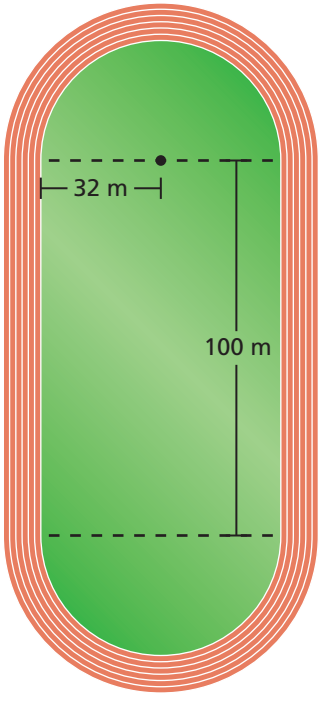
$$\approx \frac{3.14 \cdot 10}{2}$$ Substitute 3.14 for π and 10 for d.

$$= 15.7$$ Simplify.

∴ So, the perimeter is about $14 + 15.7 = 29.7$ feet.

EXAMPLE 3 Finding a Perimeter

The running track is made up of a rectangle and two semicircles. Find the perimeter.



The semicircular ends of the track form a circle with a radius of 32 meters. Find its circumference.

$$C = 2\pi r$$ Write formula for circumference.

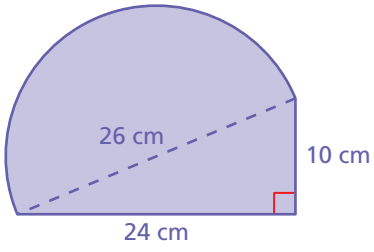
$$\approx 2 \cdot 3.14 \cdot 32$$ Substitute 3.14 for π and 32 for r.

$$= 200.96$$ Multiply.

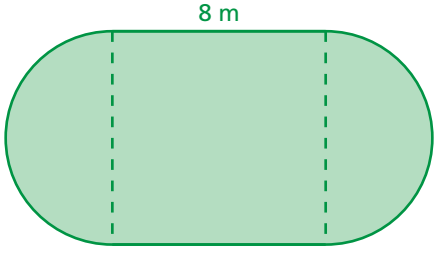
∴ So, the perimeter is about $100 + 100 + 200.96 = 400.96$ meters.

On Your Own

3. The figure is made up of a semicircle and a triangle. Find the perimeter.



4. The figure is made up of a square and two semicircles. Find the perimeter.



Now You're Ready
Exercises 9–11

8.2 Exercises

Check It Out
Help with Homework
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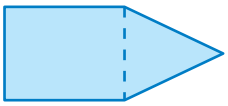
Vocabulary and Concept Check

1. **REASONING** Is the perimeter of the composite figure equal to the sum of the perimeters of the individual figures? Explain.

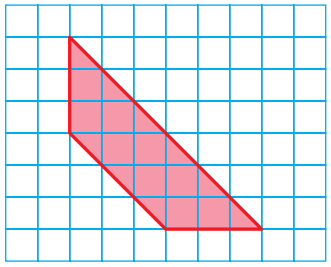


2. **OPEN-ENDED** Draw a composite figure formed by a parallelogram and a trapezoid.

Practice and Problem Solving

Estimate the perimeter of the figure.

1 3.



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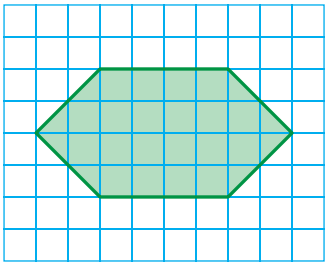

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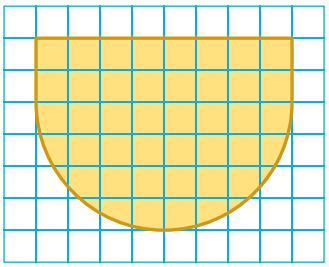

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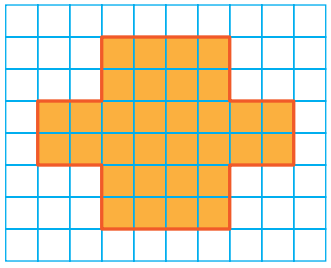

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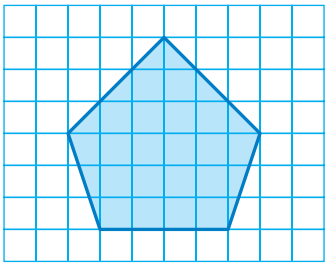

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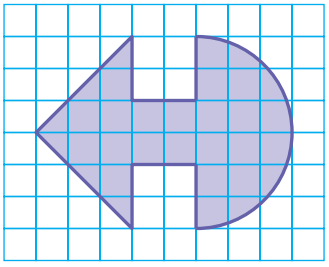
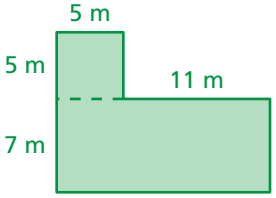


Find the perimeter of the figure.

2 9.



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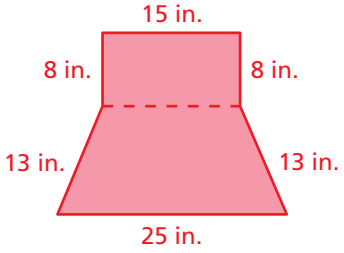
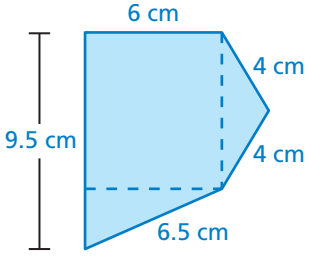
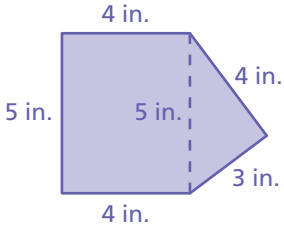


11.



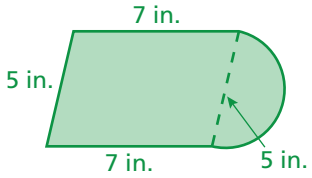
12. **ERROR ANALYSIS** Describe and correct the error in finding the perimeter of the figure.



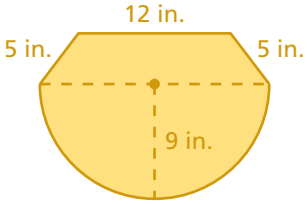
✗ Perimeter = 4 + 3 + 4 + 5 + 4 + 5
= 25 in.

Find the perimeter of the figure.

13.



14.



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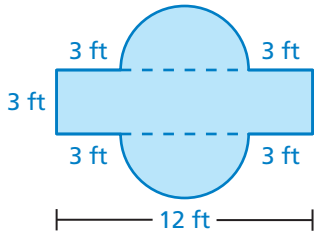
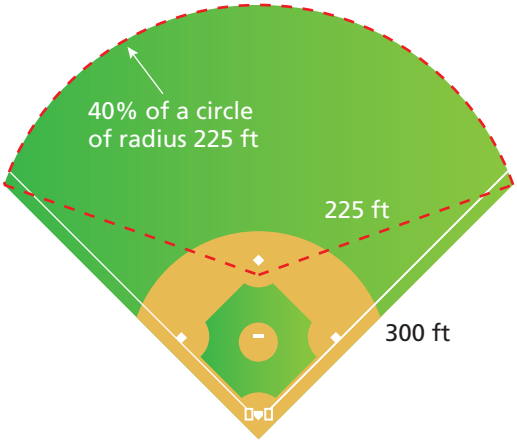


16. PASTURE A farmer wants to fence a section of land for a horse pasture. Fencing costs $27 per yard. How much will it cost to fence the pasture?



17. BASEBALL You run around the perimeter of the baseball field at a rate of 9 feet per second. How long does it take you to run around the baseball field?

18. TRACK In Example 3, the running track has six lanes. Explain why the starting points for the six runners are staggered. Draw a diagram as part of your explanation.

STEM VIDEO

19. Critical Thinking How can you add a figure to a composite figure without increasing its perimeter? Draw a diagram to support your answer.

Fair Game Review What you learned in previous grades & lessons

Evaluate the expression. *(Skills Review Handbook)*

20. $2.15(3)^2$ **21.** $4.37(8)^2$ **22.** $3.14(7)^2$ **23.** $8.2(5)^2$

24. MULTIPLE CHOICE Which expression is equivalent to $(5y + 4) - 2(7 - 2y)$? *(Section 3.2)*

(A) $y - 10$ (B) $9y + 18$ (C) $3y - 10$ (D) $9y - 10$