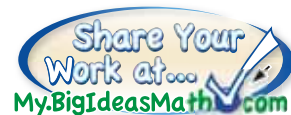


7.5 Finding Dimensions of Plane Figures

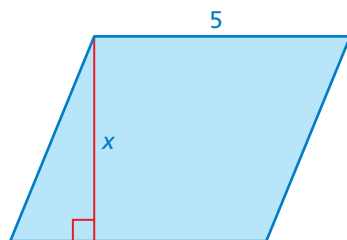
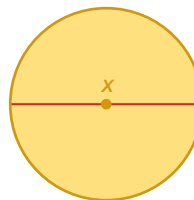
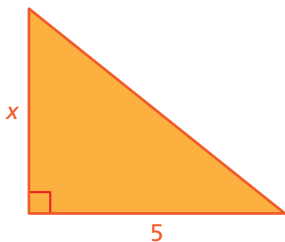
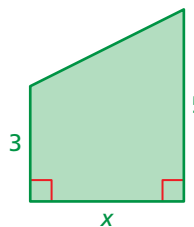
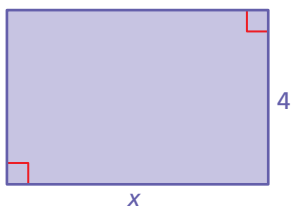
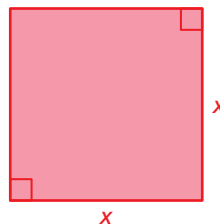
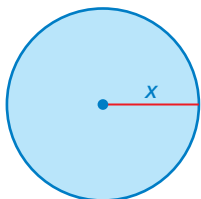
Essential Question How can you use area and perimeter formulas to find missing dimensions of plane figures?



1 ACTIVITY: Finding Missing Dimensions

Work with a partner. Match the equation with a figure. Then use the equation to solve for x .

- | | |
|-------------------------------------|----------------------------------|
| a. Area: $24 = 4x$ | b. Perimeter: $24 = 4x$ |
| c. Circumference: $8\pi = 2\pi x$ | d. Area: $20 = 5x$ |
| e. Area: $16 = \frac{1}{2}x(5 + 3)$ | f. Area: $10 = \frac{1}{2}(5x)$ |
| g. Perimeter: $30 = 20 + 2x$ | h. Circumference: $4\pi = \pi x$ |



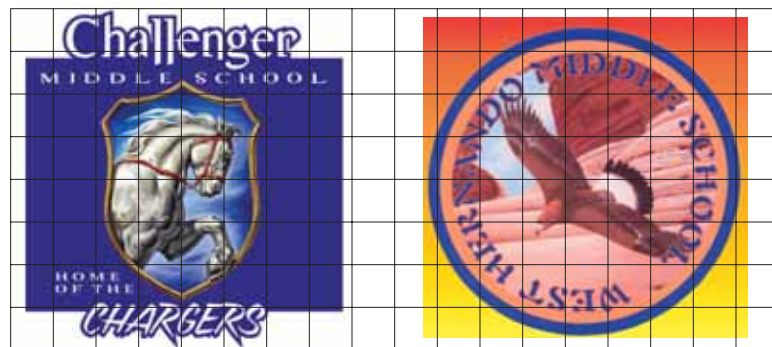
2 ACTIVITY: Finding Dimensions

Work with a partner. This is a sign at Madeira Beach Middle School. Estimate the missing dimension.



3 ACTIVITY: Drawing a School Logo

Work with a partner. Draw your school's logo on grid paper. Assign a scale to your drawing. Estimate the area and perimeter of all or part of your logo.



Challenger Middle School

West Hernando Middle School

What Is Your Answer?

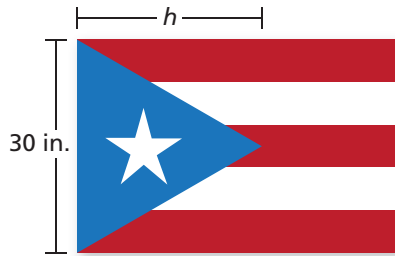
- IN YOUR OWN WORDS** How can you use area and perimeter formulas to find missing dimensions of plane figures? Draw a plane figure and label its dimensions. Find the area or perimeter. Then erase one of the dimensions and show how you can use algebra to find it again.

Practice

Use what you learned about finding dimensions of plane figures to complete Exercises 3–5 on page 310.

EXAMPLE 1 Finding Missing Dimensions

- a. The blue triangle in the Puerto Rican flag has an area of 390 square inches. What is the height of the triangle?



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

Write formula for area of a triangle.

$$390 = \frac{1}{2}(30)h$$

Substitute 390 for A and 30 for b .

$$390 = 15h$$

Multiply $\frac{1}{2}$ and 30.

$$\frac{390}{15} = \frac{15h}{15}$$

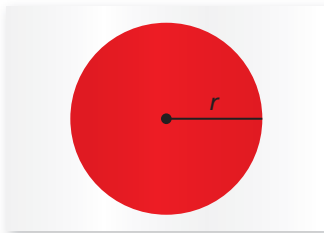
Divide each side by 15.

$$26 = h$$

Simplify.

- The height of the triangle is 26 inches.

- b. The circle in the Japanese flag has a circumference of 4.71 feet. What is the radius of the circle?



$$C = \pi d$$

Write formula for circumference.

$$4.71 \approx 3.14d$$

Substitute 4.71 for C and 3.14 for π .

$$\frac{4.71}{3.14} = \frac{3.14d}{3.14}$$

Divide each side by 3.14.

$$1.5 = d$$

Simplify.

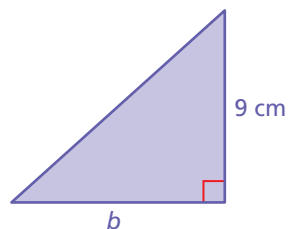
- So, the radius is about $1.5 \div 2$, or 0.75 feet.

On Your Own

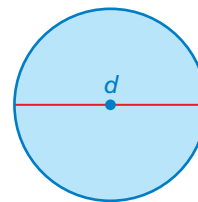
Now You're Ready
Exercises 3–11

Write and solve an equation to find the missing dimension of the figure. Check your solution.

1. Area = 45 cm^2

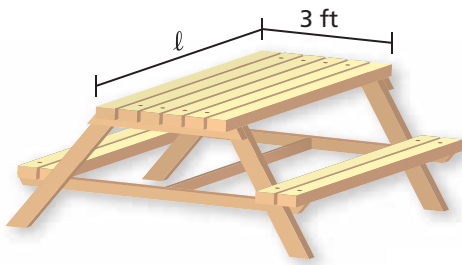


2. Circumference = 28.26 m



EXAMPLE 2 Finding a Missing Dimension

The top of the table has a perimeter of 22 feet. What is the length?



$$P = 2\ell + 2w$$

Write formula for perimeter of a rectangle.

$$22 = 2\ell + 2(3)$$

Substitute 22 for P and 3 for w .

$$22 = 2\ell + 6$$

Multiply 2 and 3.

$$\begin{array}{r} -6 \\ 22 = 2\ell + 6 \\ \hline \end{array}$$

Subtract 6 from each side.

$$16 = 2\ell$$

Simplify.

$$\frac{16}{2} = \frac{2\ell}{2}$$

Divide each side by 2.

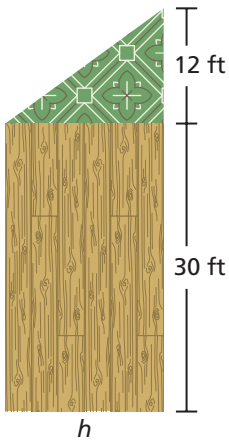
$$8 = \ell$$

Simplify.

∴ The length of the table is 8 feet.

EXAMPLE 3 Real-Life Application

The rectangular part of a dance studio covers 495 square feet. What is the area of the triangular part?



Use the rectangle to solve for h .

$$A = 30h$$

Use the formula for area of a rectangle.

$$495 = 30h$$

Substitute 495 for A .

$$\frac{495}{30} = \frac{30h}{30}$$

Divide each side by 30.

$$16.5 = h$$

Simplify.

Use $h = 16.5$ to find the area of the triangle.

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

Write formula for area of a triangle.

$$A = \frac{1}{2}(12)(16.5)$$

Substitute 12 for b and 16.5 for h .

$$A = 99$$

Simplify.

∴ The area of the triangular part is 99 square feet.

On Your Own

- WHAT IF?** In Example 2, the tabletop has a perimeter of 18 feet. Write and solve an equation to find the length.
- WHAT IF?** In Example 3, the rectangular part covers 600 square feet. What is the area of the triangular part?

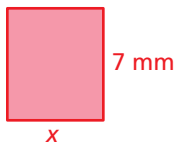
Vocabulary and Concept Check

- WRITING** Explain what is wrong with the statement.
“The length of the rectangle is 30 square centimeters.”
- OPEN-ENDED** Give an example of a rectangle that has an area of 48 square inches. What is its length? its width?

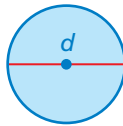
Practice and Problem Solving

Write and solve an equation to find the missing dimension of the figure.
Check your solution.

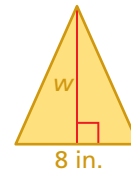
1 2 3. Area = 42 mm^2



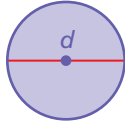
4. Circumference = 62.8 m



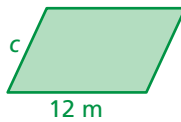
5. Area = 36 in.^2



6. Circumference = 15.7 yd



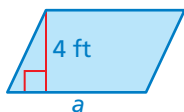
7. Perimeter = 40 m



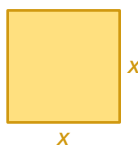
8. Perimeter = 24 ft



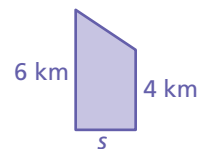
9. Area = 27 ft^2



10. Perimeter = 18 in.



11. Area = 15 km^2



12. **ERROR ANALYSIS** Describe and correct the error in finding the height h of the triangle.

X $A = \frac{1}{2}bh$ Area = 32 in.^2

$32 = \frac{1}{2}(16)h$

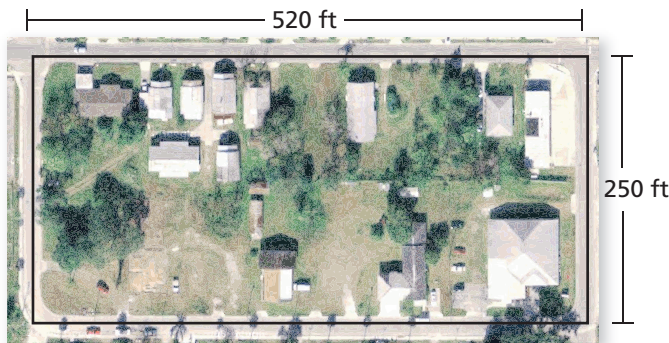
$32 = 8h$

$256 = h$

13. **YIELD SIGN** The yield sign has a perimeter of 2.28 meters . What is the side length x ?

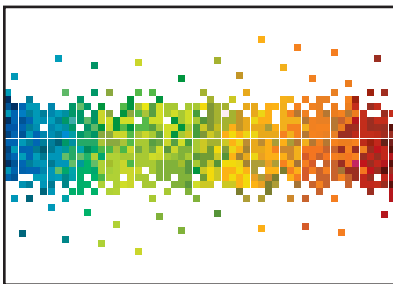


14. **GLASS** You want to place your juice glass on a circular coaster. The area of the coaster is 12.56 square inches. What is the diameter of the largest juice glass that you can fit on the coaster? Use 3.14 for π .
15. **GARDENING** You plant 576 flower seeds in a window box. You plant 3 seeds per square inch. The box is 8 inches wide. How long is it?
16. **BICYCLING** You ride your bicycle once around the city block and count the number of times the front wheel on your bike rotates.



- a. How can you find the diameter of the wheel?
- b. The wheel rotates 200 times. What is the diameter of the wheel? Use $\frac{22}{7}$ for π .

17. **DOOR** A door is made up of a semicircle and a rectangle. The area of the door is 26.28 square feet. What is the height h of the door? Use 3.14 for π .



18. **MURAL** A mural has a perimeter of 20 feet and an area of 24 square feet.
- a. Find the length and width of the mural using trial and error. Organize your results in a table.
- b. **Reasoning** Explain how to find the length and width of the mural using the figure.



Fair Game Review What you learned in previous grades & lessons

Solve the equation. Check your solution.

19. $4x = 64$

20. $\frac{1}{3}y = 51$

21. $6(7)h = 189$

22. $\frac{1}{4}(7)w = 14$

23. **MULTIPLE CHOICE** What value is a solution of $7x = 42$?

(A) $x = \frac{1}{6}$

(B) $x = 6$

(C) $x = 42$

(D) $x = 294$