

Perimeter and Area of Figures

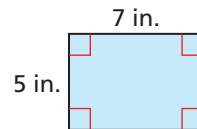
Perimeter and Area of Polygons

The **perimeter** P of a figure is the distance around the figure. The **area** A of a figure is the number of square units enclosed by the figure.

Perimeter and Area				
Square	Rectangle	Triangle	Parallelogram	Trapezoid
$P = 4s$	$P = 2\ell + 2w$	$P = a + b + c$	$A = bh$	$A = \frac{1}{2}h(b_1 + b_2)$
$A = s^2$	$A = \ell w$	$A = \frac{1}{2}bh$		

Example 1 Find the perimeter and area of the figure.

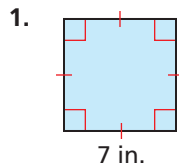
$$\begin{aligned}
 P &= 2\ell + 2w & A &= \ell w \\
 &= 2(7) + 2(5) & &= 7(5) \\
 &= 24 \text{ in.} & &= 35 \text{ in.}^2
 \end{aligned}$$



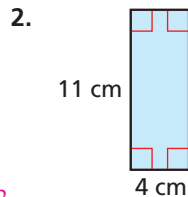
Practice

Check your answers at BigIdeasMath.com.

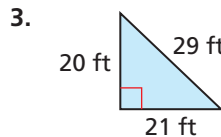
Find the perimeter and area of the figure.



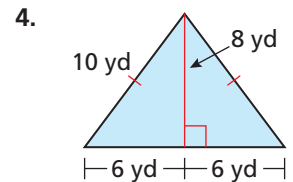
$P = 28 \text{ in.}; A = 49 \text{ in.}^2$



$P = 30 \text{ cm}; A = 44 \text{ cm}^2$

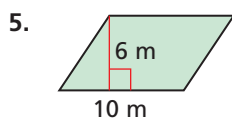


$P = 70 \text{ ft}; A = 210 \text{ ft}^2$

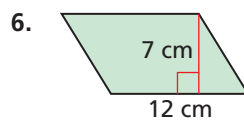


$P = 32 \text{ yd}; A = 48 \text{ yd}^2$

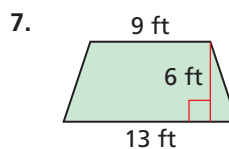
Find the area of the figure.



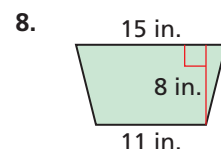
60 m^2



84 cm^2



66 ft^2



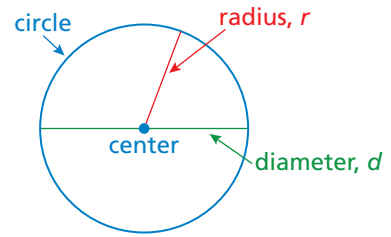
104 in.^2

Use a geometric formula to solve the problem.

9. A triangle has a base of 7 feet and an area of 63 square feet. Find the height. **18 ft**
10. A rectangle has a length of 6 inches and a perimeter of 28 inches. Find the width. **8 in.**

Circumference and Area of a Circle

A **circle** is the set of all points in a plane that are the same distance from a point called the **center**. The distance from the center to any point on the circle is the **radius**. The distance across the circle through the center is the **diameter**. The diameter is twice the radius.



The **circumference** of a circle is the distance around the circle. The ratio $\frac{\text{circumference}}{\text{diameter}}$ is the same for every circle and is represented by the Greek letter π , called **pi**. Pi is an irrational number whose value is approximately 3.14 or $\frac{22}{7}$.

Circumference of a Circle	Area of a Circle
The circumference C of a circle is equal to π times the diameter d or π times twice the radius r . $C = \pi d$ or $C = 2\pi r$	The area A of a circle is the product of π and the square of the radius. $A = \pi r^2$

Example 1 The diameter of a circle is 8.5 meters. Find the radius.

$$\begin{aligned} r &= \frac{d}{2} && \text{Radius of a circle} \\ &= \frac{8.5}{2} && \text{Substitute 8.5 for } d. \\ &= 4.25 && \text{Divide.} \end{aligned}$$

▶ The radius is 4.25 meters.

Example 2 The radius of a circle is $5\frac{3}{4}$ feet. Find the diameter.

$$\begin{aligned} d &= 2r && \text{Diameter of a circle} \\ &= 2\left(5\frac{3}{4}\right) && \text{Substitute } 5\frac{3}{4} \text{ for } r. \\ &= 11\frac{1}{2} \end{aligned}$$

▶ The diameter is $11\frac{1}{2}$ feet.

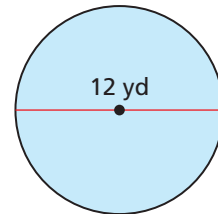
Example 3 Find (a) the circumference C and (b) the area A of the circle.

a. $C = \pi d$
 $= \pi(12)$
 ≈ 37.7

▶ The circumference is about 37.7 yards.

b. $A = \pi r^2$
 $= \pi \cdot (6)^2$
 $= 36\pi$
 ≈ 113.1

▶ The area is about 113.1 square yards.



Practice

Check your answers at BigIdeasMath.com.

11. The radius of a circle is 4.6 millimeters. Find the diameter. **9.2 mm**

12. The diameter of a circle is $2\frac{1}{4}$ miles. Find the radius. **$1\frac{1}{8}$ mi**

Find the circumference and area of the circle with the given radius or diameter.

13. $r = 16$ inches

$$\begin{aligned} C &\approx 100.5 \text{ in.;} \\ A &\approx 804.2 \text{ in.}^2 \end{aligned}$$

14. $d = 10$ centimeters

$$\begin{aligned} C &\approx 31.4 \text{ cm;} \\ A &\approx 78.5 \text{ cm}^2 \end{aligned}$$

15. $r = 7$ meters

$$\begin{aligned} C &\approx 44 \text{ m;} \\ A &\approx 153.9 \text{ m}^2 \end{aligned}$$

16. $d = 2.4$ yards

$$\begin{aligned} C &\approx 7.5 \text{ yd;} \\ A &\approx 4.5 \text{ yd}^2 \end{aligned}$$

17. The area of a circle is 81π square feet. Find the radius. **9 ft**