

1-5 Using Formulas in Geometry

Come in
and get in
groups of 4
or 5!

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Objective

Apply formulas for perimeter, area, and circumference.

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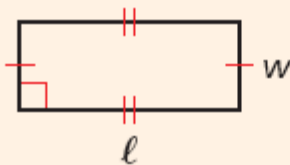
The **perimeter** P of a plane figure is the sum of the side lengths of the figure.

The **area** A of a plane figure is the number of non-overlapping square units that cover a figure.

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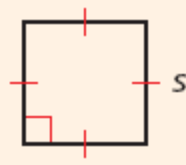
Perimeter and Area

RECTANGLE



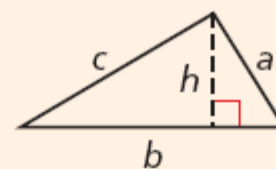
$$P = 2l + 2w \text{ or } 2(l + w)$$
$$A = lw$$

SQUARE



$$P = 4s$$
$$A = s^2$$

TRIANGLE

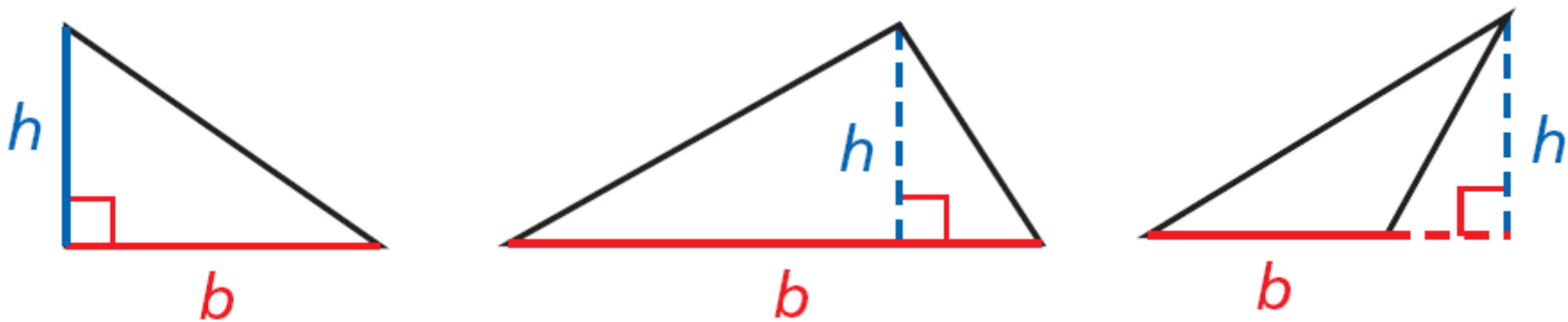


$$P = a + b + c$$
$$A = \frac{1}{2}bh \text{ or } \frac{bh}{2}$$

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The **base** b can be any side of a triangle.

The **height** h is a segment from a vertex that forms a right angle with a line containing the base. The height may be a side of the triangle, inside, or outside of the triangle.



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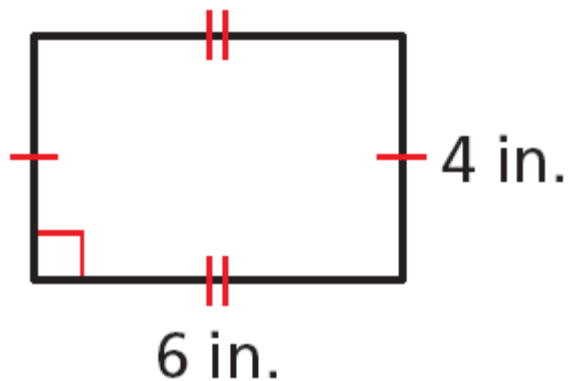
Remember!

Perimeter is expressed in linear units, such as inches (in.) or meters (m). Area is expressed in square units, such as square centimeters (cm^2).

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Example 1A: Finding Perimeter and Area

Find the perimeter and area of each figure.



$$\begin{aligned}P &= 2\ell + 2w \\ &= 2(6) + 2(4) \\ &= 12 + 8 = 20 \text{ in.}\end{aligned}$$

$$\begin{aligned}A &= \ell w \\ &= (6)(4) = 24 \text{ in}^2\end{aligned}$$

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Check It Out! Example 1

Find the perimeter and area of a square with $s = 3.5$ in.

$$P = 4s$$

$$A = s^2$$

$$P = 4(3.5)$$

$$A = (3.5)^2$$

$$P = 14 \text{ in.}$$

$$A = 12.25 \text{ in}^2$$

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Example 2: Crafts Application

The Queens Quilt block includes 12 blue triangles. The base and height of each triangle are about 4 in. Find the approximate amount of fabric used to make the 12 triangles.

The area of one triangle is

$$A = \frac{1}{2}bh = \frac{1}{2}(4)(4) = 8 \text{ in}^2.$$

The total area of the 12 triangles is $12(8) = 96 \text{ in}^2$.

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Check It Out! Example 2

Find the amount of fabric used to make four rectangles. Each rectangle has a length of $6\frac{1}{2}$ in. and a width of $2\frac{1}{2}$ in.

The area of one triangle is

$$A = \ell w = \left(6\frac{1}{2}\right)\left(2\frac{1}{2}\right) = 16\frac{1}{4} \text{ in}^2.$$

The amount of fabric to make four rectangles is

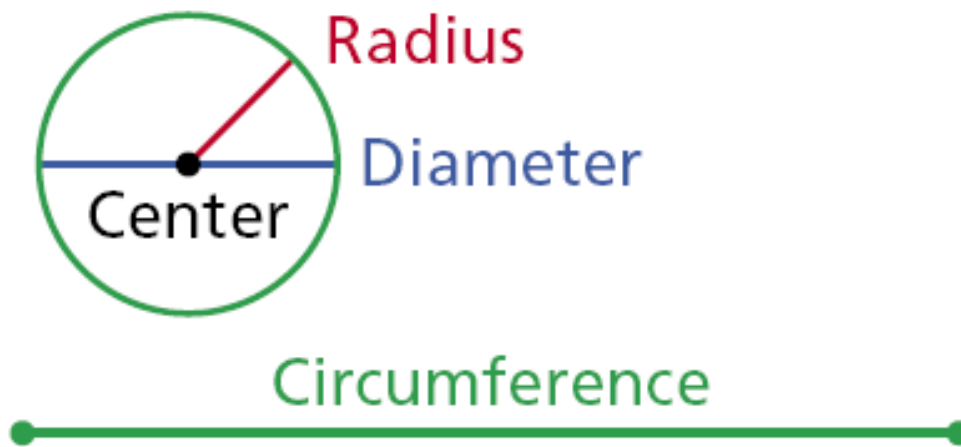
$$4\left(16\frac{1}{4}\right) = 65 \text{ in}^2.$$

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Diameter – line through the center across a circle.

Radius – line from the center to a point on the circle.

The **circumference** of a circle is the distance around the circle.



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Circumference and Area of a Circle

The circumference C of a circle is given by the formula $C = \pi d$ or $C = 2\pi r$.

The area A of a circle is given by the formula $A = \pi r^2$.

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Example 3: Finding the Circumference and Area of a Circle

Find the circumference and area of a circle with radius 8 cm. Use the π key on your calculator. Then round the answer to the nearest tenth.

$$\begin{aligned}C &= 2\pi r \\ &= 2\pi (8) = 16\pi \\ &\approx 50.3 \text{ cm}\end{aligned}$$

$$\begin{aligned}A &= \pi r^2 \\ &= \pi (8)^2 = 64\pi \\ &\approx 201.1 \text{ cm}^2\end{aligned}$$

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Check It Out! Example 3

Find the circumference and area of a circle with radius 14m.

$$\begin{aligned}C &= 2\pi r \\ &= 2\pi (14) = 28\pi \\ &\approx 88.0 \text{ m}\end{aligned}$$

$$\begin{aligned}A &= \pi r^2 \\ &= \pi (14)^2 = 196\pi \\ &\approx 615.8 \text{ m}^2\end{aligned}$$

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Find the Value of each missing measure of a triangle.

1. Base = 2 feet

Area = 28 square feet

Find the height.

2. Height = 22.6 yards

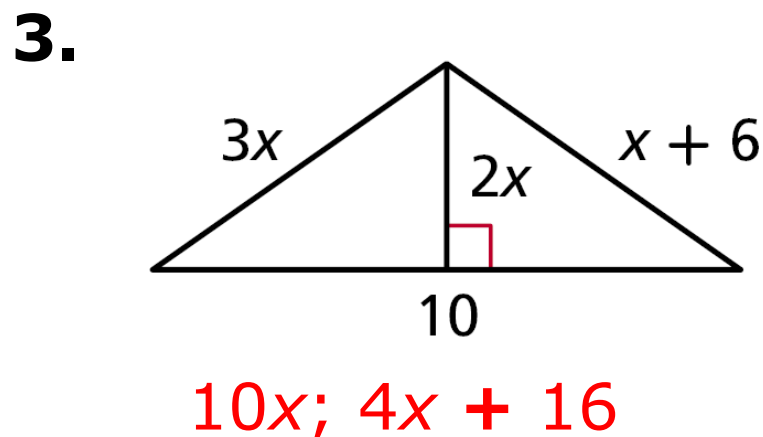
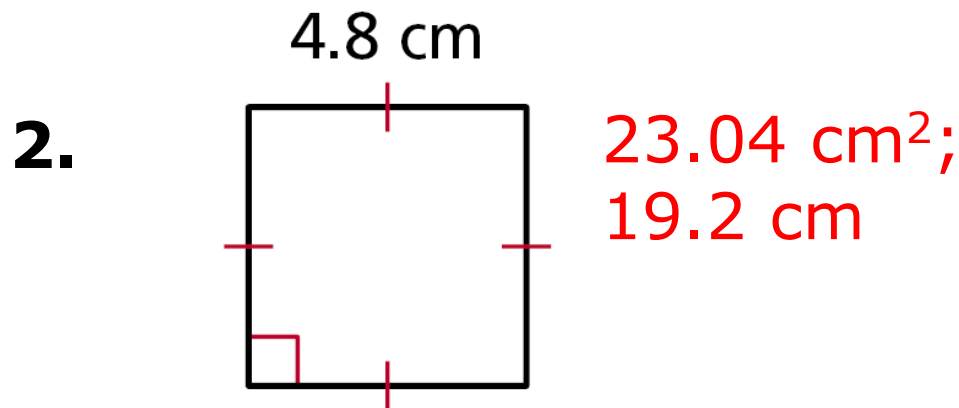
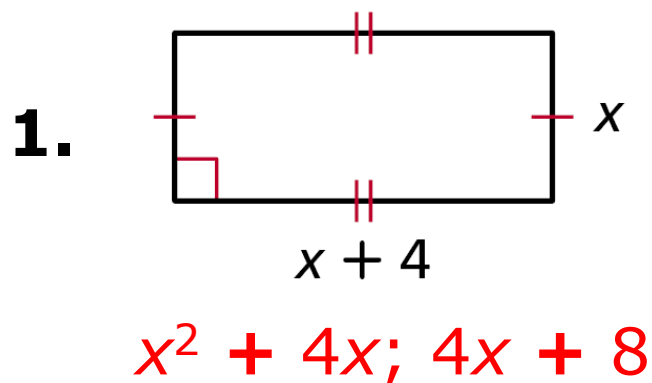
Area = 282.5 square yards

Find the base.

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Lesson Quiz: Part I

Find the area and perimeter of each figure.



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Lesson Quiz: Part II

Find the circumference and area of each circle. Leave answers in terms of π .

4. radius 2 cm $4\pi^2$ cm; 4π cm²

5. diameter 12 ft $36\pi^2$ ft; 12π ft²

6. The area of a rectangle is 74.82 in², and the length is 12.9 in. Find the width.

5.8 in

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HOMework:

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