

§6-1**PERIMETER AND CIRCUMFERENCE****Definition**

Perimeter is a measure of the distance around a figure.

For a polygon, the perimeter is the sum of the lengths of its sides. For a circle, the measure of the distance around a circle is called the circumference.

Definition

The circumference of a circle is the perimeter of the circle.

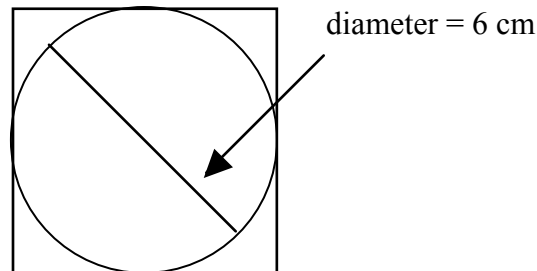
Formula

The circumference of a circle is given by the equation: $C = 2\pi r$ where r is the radius of the circle (the distance from the center of the circle to its edge).

The diameter of a circle is twice its radius.

Example 1

For the diagram below, find the perimeter of the square and the circumference of the circle.

**Solution**

Since the circle is inscribed inside the square, the diameter of circle is equal in length to the side of the square. Since the square has four equal sides, its perimeter is:

$$6 \text{ cm} + 6 \text{ cm} + 6 \text{ cm} + 6 \text{ cm} = 24 \text{ cm}$$

Since the diameter of the circle is 6 cm its circumference is given by:

$$C = 2\pi r = 2\pi \cdot 6 = 12\pi$$

Example 2

A certain square has the same perimeter as a 10 by 2 foot rectangle. How long is a side of the square?

Solution

The length of the rectangle is 10 ft and its width is 2 feet so its perimeter is given by:

$$P = 2l + 2w = 2 \cdot 10 + 2 \cdot 2 = 24$$

Since the square has four equal side lengths, each of its sides is one-fourth of 24 ft. Therefore the square has sides which are 6 ft in length.

Example 3

The width of a rectangle is twice its length. If its perimeter is 27 cm, find the length and width.

Solution

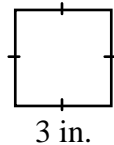
If the length is given by l , then the width is $w = 2l$. Therefore

$$P = 2l + 2w = 2l + 2(2l) = 2l + 4l = 6l$$

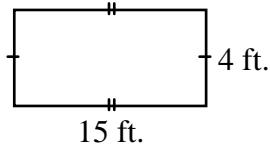
Thus $6l = 27$ and $l = 4.5$. So the length is 4.5 cm and the width is 9 cm.

Find the perimeter of each figure below.

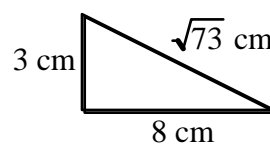
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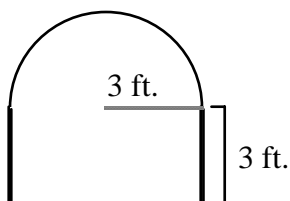
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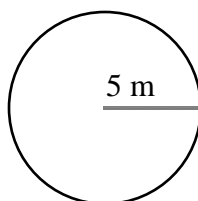
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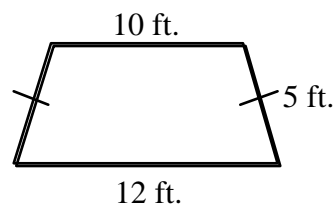
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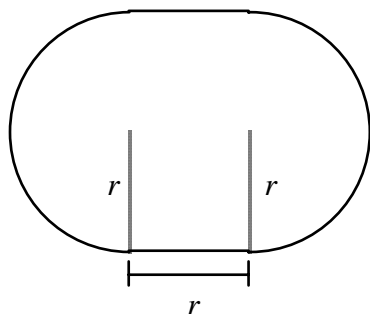


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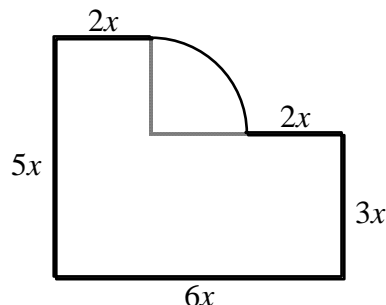


For each shape below find an expression for the perimeter.

7.

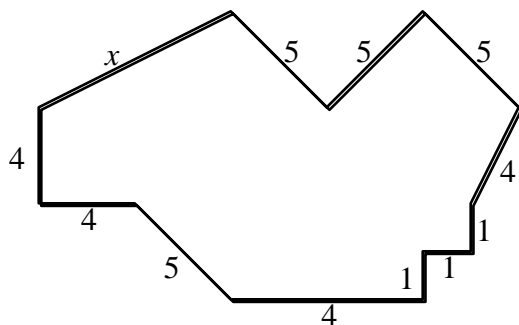


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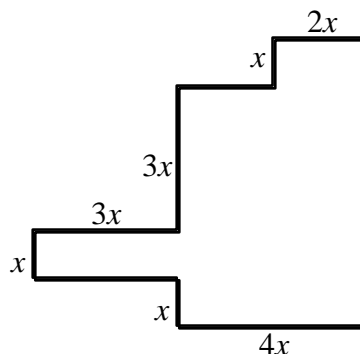


For each shape below use the perimeter, p , to find x .

9. $p = 46$



10. $p = 52$



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|----|-----------|-----|--------|----|---------------------|----|-----------------|
| 1. | 12 in. | 2. | 38 ft. | 3. | $11 + \sqrt{73}$ cm | 4. | $12 + 3\pi$ ft. |
| 5. | 10π m | 6. | 32 ft. | 7. | $2r(1 + \pi)$ | 8. | $x(18 + \pi)$ |
| 9. | 7 | 10. | 2 | | | | |