Perimeter and Circumference

In this section, we will learn how to find the perimeter of some common Geometric shapes.

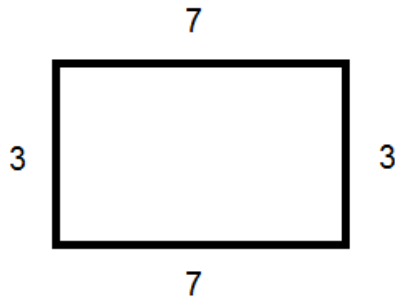## Perimeter

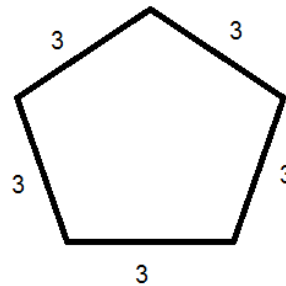**Figure 1**   **Figure 2**

Perimeter is the distance around a two-dimensional shape. For example, the perimeter of the rectangle in the graph is 7+3+7+3=20 units, and the perimeter of the pentagon is 3+3+3+3+3=15 units.

You could choose to memorize a formula for a rectangle's perimeter:

Rectangle Perimeter = 2(length+width)

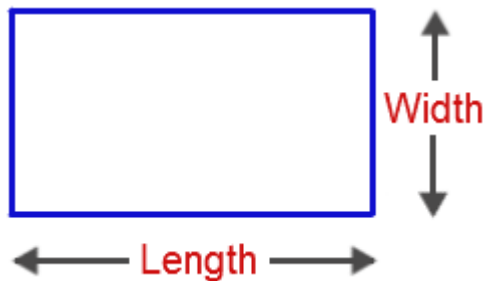**Figure 3**

For example, to find the perimeter of the rectangle in Figure 1, we can use the formula:

Perimeter = 2(length+eidth) = 2(7+3) = 20 units

It's fairly easy to understand this formula.

Circumference

We give a special name to a circle's perimeter—circumference. There are two formulas for circumference:
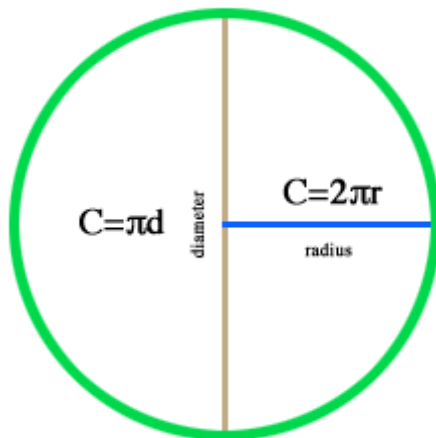

Figure 4

When we deal with circles, always remember that the diameter is twice as long as the radius, or $d = 2r$. This is why the circumference formulas $C = \pi d$ and $C = 2\pi r$ are equivalent.

[**Example 1**] A circle's radius is 5 centimeters. Find its circumference in terms of π. Then, round your answer to the hundredth place.

[**Solution**] Since the radius is given, we should use the formula $C = 2\pi r$. We have:

$$C = 2\pi r = 2\pi \cdot 5 = 10\pi \text{ centimeters}$$

Next, we will change 10π into a decimal. In middle school, we usually change π into 3.14. At college level, we use a scientific calculator to get a more accurate value of π: 3.1415926...

A calculator tells us:

$$10\pi \approx 31.415926... \approx 31.42 \text{ centimeters}$$

Solution: The circle's circumference is 10π centimeters, or approximately 31.42 centimeters.

Note that we need the value 10π because it is accurate, without being rounded. In science, usually we need a more accurate value than rounding to the hundredth place. Using an accurate value is always a good idea.

If a circle's diameter is given, we would use the first formula $C = \pi d$.

In the next two examples, a circle's circumference is given, and you are asked to solve equations to find its radius or diameter.

[**Example 2**] A circle's circumference is 7π inches. Find this circle's radius.

[**Solution**] Since this problem is related to the circle's radius, we use the formula $C = 2\pi r$. Plug in $C = 7\pi$ and solve for *r*, we have:

$$C = 2\pi r$$
$$7\pi = 2\pi r$$
$$\frac{7\pi}{2\pi} = \frac{2\pi r}{2\pi}$$
$$3.5 = r$$

Solution: The circle's radius is 3.5 inches.

[**Example 3**] A circle's circumference is 50 inches. Find this circle's diameter. Round your answer to the hundredth place.

[**Solution**] Since this problem is related to the circle's diameter, we use the formula $C = \pi d$. Plug in $C = 50$ and solve for *d*, we have:

$$C = \pi d$$
$$50 = \pi d$$
$$\frac{50}{\pi} = \frac{\pi d}{\pi}$$
$$15.92 \approx d$$

Solution: The circle's diameter is approximately 15.92 inches.