Areas of Circle, Segments, and Sectors - Lesson 11-6

Here's your warmup!

An equilateral triangle has sides of length 6. A second triangle is similar to it, and has sides of length of 18. Find the ratio of the area of the smaller Δ to the area of the larger Δ.

Let's start by remembering the formula for the area of a circle:

Postulate:

The area of a circle is given by the formula

$$A = \pi r^2$$

where A is the area, and r is the radius of the circle.

Now, you should practice this by applying it to a couple of problems (these should all be pretty straight forward for you to solve):

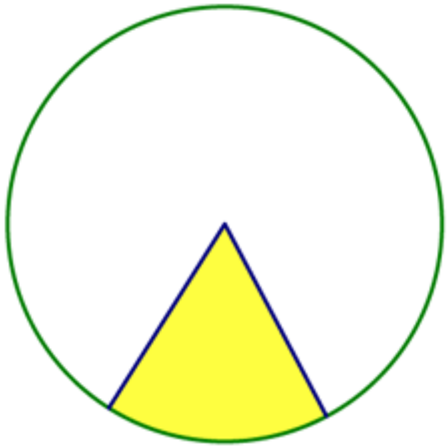
Find the circumference of a circle whose area is 36π cm^2.

Find the area of a circle whose circumference is 9π cm.

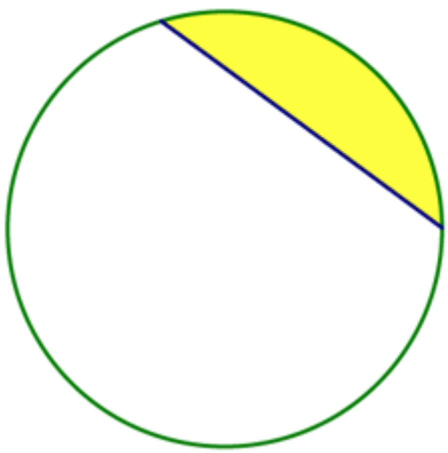
Find the diameter of a circle whose area is $\frac{9}{4}\pi$ cm^2.

Find the radius of a circle whose circumference is 12 cm.

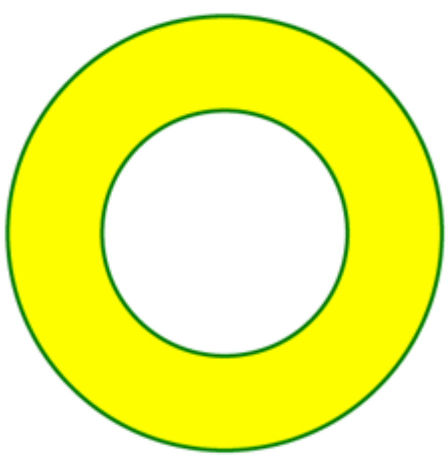
At this point we need to define some new areas that are associated with circles.



A *sector of a circle* is the region between two radii of a circle and the included arc

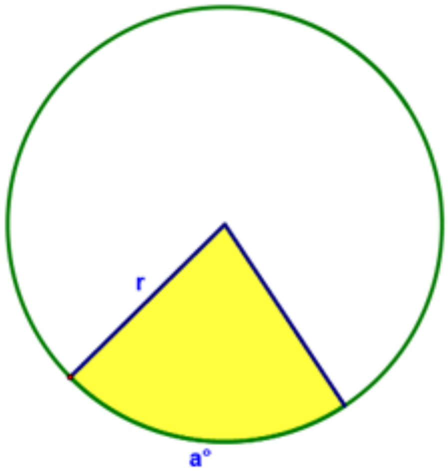


A *segment of a circle* is the region between a chord of a circle and the included arc.



An *annulus* is the region between two concentric circles (the yellow area in the diagram to the left)

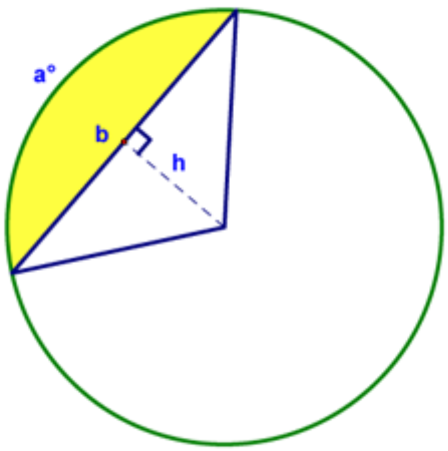
For each of these, a different technique is used to find its area:



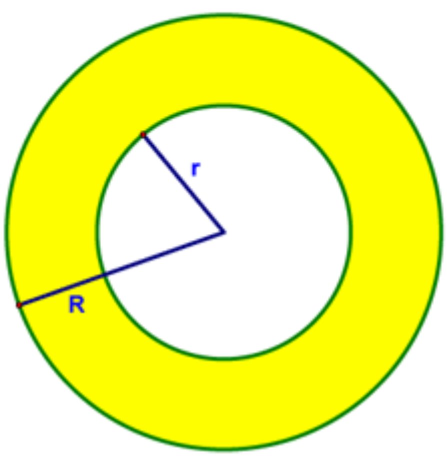
Theorem 106 - The area of a sector of a circle is equal to the area of the circle times the fractional part of the circle detemined by the sector's arc

$$A = \left(\frac{a}{360}\right)\pi r^2$$

where r is the radius and a is measured in degrees (*Sector Area Theorem*).

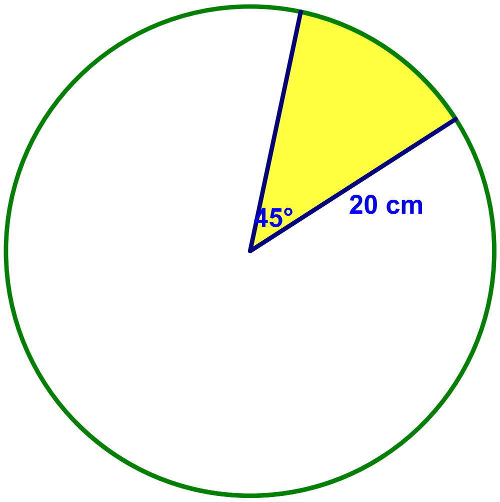


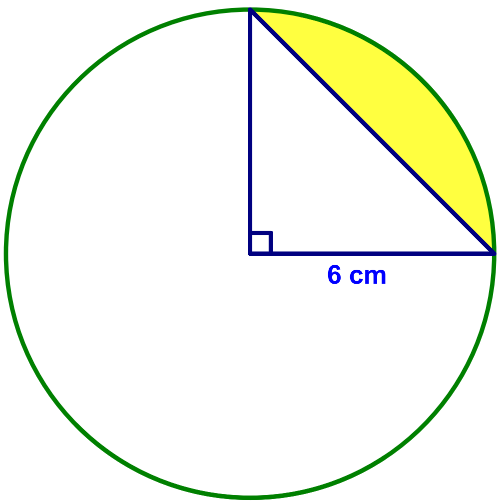
$$A_{Segment} = A_{Sector} - A_{Triangle}$$
$$= \frac{a}{360}(\pi r^2) - \frac{1}{2}bh$$

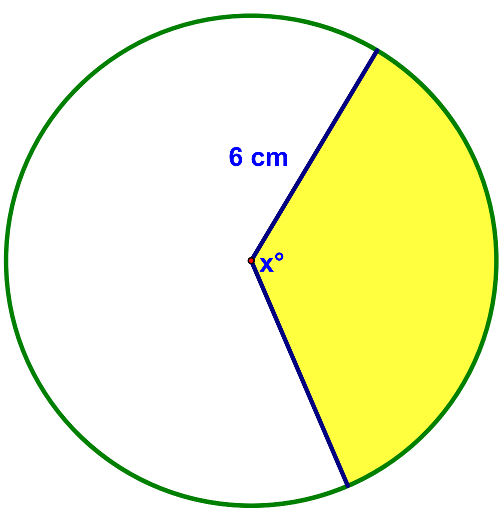


$$A_{Annulus} = A_{Big\ Circle} - A_{Small\ Circle}$$
$$= \pi R^2 - \pi r^2$$

Here are some examples using the information in today's lesson. Find the yellow area (or x) in each case!







Find x given that the shaded area is 14π cm^2.