

Algebra 2
Unit: Geometry
Section: Geometry of Circles

Example: Angles and Arcs of Circles

Problem:

Shown below is circle C, with central angle ACB drawn. Given that major arc ADB measures $(45x + 18)^\circ$ and angle ACB measures $(15x - 18)^\circ$. Find the value of x . Then find the measure of major arc ADB, minor arc AC and the measure of angle ACB.

Solution:

To begin this problem, we must remember the property that a central angle has measure equal to its intercepted arc. In this case, angle ACB will have the same measure as minor arc AB.

This problem, however, gives us information about the measure of major arc ADB. To find the measure of minor arc AB, we must begin by subtracting that value from 360 degrees.

The measure of arc AB equals 360 minus the measure of arc ADC.

Using the information given in the problem and being very careful to use parentheses, you can write the equation: the measure of arc AB equals 360 minus the quantity 45 x plus 18.

This simplifies to the measure of arc AB equals 342 minus 45 x .

We know the property of central angles: the measure of the central angle ACB is equal to the measure of the intercepted arc AB.

Using the information given in the problem and what we found for arc AB, we can write the equation $15x - 18$ equals $342 - 45x$.

Solve this equation to get x equals 6.

The problem has asked us to find the measures of both the major arc ADB and the minor arc AB as well as the measure of angle ACB. We do this simply by substituting in the x -value that we found. This is a way to check to make sure that the work we have done is correct.

The measure of major arc ADB equals 45 times 6 plus 18. This equals 288 degrees.

Minor arc AB is equal to 360 minus the measure of arc ADB, this is 360 minus 288 which equals 72 degrees.

The measure of central angle ACB equals 15 times 6 minus 18. This equals 72 degrees.

We can see, since the central angle and the intercepted arc have the same measure, that our calculations are correct.