

Algebra 2
Unit: Geometry
Section: Geometry of Circles

Tutorial: Tangents and Secants of Circles

Slide 1:

In this tutorial we are going to discuss how to solve problems involving tangents and secants of circles.

Slide 2:

Tangents of circles.

A tangent is a line in the same plane as a circle that intersects the circle in exactly one point, called the point of tangency.

If two segments from the same exterior point are tangent to a circle, then they are congruent.

AB and BC are tangent to circle D. Therefore AB is congruent to BC.

Slide 3:

Example

AB and BC are tangent to circle D.

If AB is equal to four x minus five and BC is equal to two x plus nine, find x.

We know that AB is congruent to BC.

Four x minus five is equal to two x plus nine.

Two x minus five is equal to nine.

Two x is equal to fourteen.

X is equal to seven.

Slide 4:

Secants and tangents.

A secant is a line that intersects a circle at exactly two points. The following are possible scenarios of tangents and secants intersecting a circle.

Scenario 1. Two secants.

Measure of angle E is equal to one half the quantity measure of arc AC minus measure of arc BD.

Scenario 2. Secant Tangent.

Measure of angle B is equal to one half the quantity measures of arc AD minus measure of arc AC.

Scenario 3. Two tangents.

Measure of angle B is equal to one half the quantity measure of arc AEC minus measure of arc AC.

Slide 5:

Example.

The measure of arc BD is twenty six degrees.

The measure of arc AC is eighty eight degrees.

Find the measure of angle E.

This is a scenario of two secants intersecting a circle. The following equation can be written. The measure of angle E is equal to one half the quantity eighty eight minus twenty six. This equal one half of sixty two or thirty one degrees.

Slide 6:

Chords and Secants

If two secants or chords intersect in the interior of a circle, then the measure of an angle formed is one half the sum of the measure of the arcs intercepted by the angle and its vertical angle.

AC and BD are chords of the circle and meet at point E.

The measure of angle AEB is equal to one half the quantity of the measure of arc AB plus the measure of arc DC.

The measure of angle BEC is equal to one half the quantity of the measure of arc BC plus the measure of arc AD.

For example, if the measure of arc BC is twenty four degrees and the measure of arc AD is forty degrees, to find the measure of angle BEC you would write the following equation.

The measure of angle BEC is equal to one half the quantity twenty four plus forty which is equal to one half of sixty four or thirty two degrees.

Slide 7:

Now you try.

Answer the following questions. Click on solution to check your work.

Number 1. Circle with chords AC and BD, intersecting at point E. Arc AC equals x degrees. The measure of angle AED equals 50 degrees and the measure of arc BC equals 30 degrees. Solve for x.

Solution:

X equals 70 degrees.

Number 2. Circle with point B outside. Tangent line BA and secant line BC through point E on the circle and C on the circle. The measure of arc AD equals 85 degrees. The measure of arc AC equals 25 degrees. Find the measure of angle B.

Solution:

Angle B measures 30 degrees.

Slide 8:

Remember

Make sure you take notes on the equations and scenarios in this tutorial. Read each question carefully and make sure you understand what the problem is asking. Ask yourself what kind of line, chord, secant, or tangent, is intersecting the circle and how does this intersection affect the angles and arcs.