Geometry Info Sheet #43
Angles and Segments of Tangents, Secants, and Chords in Circles

Definitions

Circle: The set of all points in a plane equidistant from a given point (the **center**)

Chord: A line segment whose endpoints lie on a circle

Arc: A curved, unbroken section of a circle

Secant: A line that intersects a circle at two points; a secant always contains a chord

Tangent: A line in the plane of a circle that intersects the circle at exactly one point

The point where a tangent intersects a circle is known as the **point of tangency**.

When two chords intersect inside a circle, each chord is divided into two **segments of the chord**.

A **tangent segment** is a segment that is tangent to a circle at one of its endpoints.

A **secant segment** is a segment with one endpoint on a circle, the other endpoint outside the circle, and a point between the two endpoints that intersects the circle. The part of the secant segment that is outside the circle is called an **external segment**.

Theorems

The measure of an angle formed by a tangent and a chord/secant that intersect <u>on</u> a circle is <u>half</u> the measure of the intercepted arc.

The measure of an angle formed by two chords/secants that intersect <u>inside</u> a circle is <u>half</u> the <u>sum</u> of the measures of the intercepted arcs.

The measure of an angle formed by two lines (two tangents, two secants, or one of each) that intersect <u>outside</u> a circle is <u>half</u> the <u>difference</u> of the measures of the intercepted arcs.

If two chords intersect <u>inside</u> a circle, then the <u>product</u> of the lengths of the two segments of one chord equals the <u>product</u> of the lengths of the two segments of the other chord.

If two secants intersect <u>outside</u> a circle, then the <u>product</u> of the lengths of one whole secant segment and its external segment equals the <u>product</u> of the lengths of the other whole secant segment and its external segment.

If a secant and a tangent intersect <u>outside</u> a circle, then the <u>product</u> of the lengths of the whole secant segment and its external segment equals the length of the tangent segment <u>squared</u>.