

# Geometry Info Sheet #39

## Circle-Related Terms and Theorems; Lines and Segments that Intersect Circles

### Definitions

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

**Radius:** A line segment from the center of a circle to any point on the circle

**Chord:** A line segment whose endpoints lie on a circle

**Diameter:** A chord that contains the center of a circle; the length of a diameter of a circle is equal to twice the length of a radius of the circle

**Secant:** A line, ray, or segment that contains a chord; a secant intersects a circle at two points and passes through the circle at one or both of those points

**Tangent:** A line, ray, or segment in the plane of a circle that intersects the circle at exactly one point; a tangent is always perpendicular to a radius drawn to the intersection point (see below)

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

**Concentric Circles:** Coplanar circles that have a common center; concentric circles do not intersect

**Tangent Circles:** Coplanar circles that intersect at exactly one point; a tangent circle can be inside or outside the circle to which it is tangent

**Common Tangent:** A line, ray, or segment that is tangent to two or more coplanar circles

In a plane, two circles can intersect at zero, one, or two points. For two circles with no intersections, one circle can be completely inside or outside the other circle. For circles with one point of intersection, one circle can be mostly inside or outside the other. Circles with two points of intersection must overlap.

### Theorems

**Tangent-Radius Theorem:** If a line is tangent to a circle, then the line is perpendicular to a radius drawn to the point of tangency.

**Converse of T-R Theorem:** If a line in the plane of a circle is perpendicular to a radius at its endpoint on the circle, then the line is tangent to the circle.

**Congruent Tangents Theorem:** If two line segments are tangent to a circle from the same external point, then the segments are congruent.