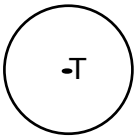
Geometry, *You Can Do It !*
Circle Theorems, lines & segments

by Bill Hanlon

A **circle** is a set of points in a plane that are a given distance from a given point, called the center.

The center is often used to name the circle.



This circle shown is described a OT.

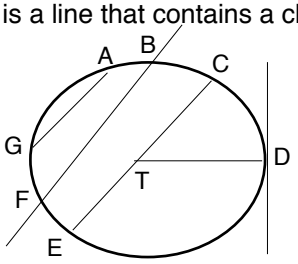
As always, when we introduce a new topic we have to define the things we wish to talk about.

A **RADIUS** of a circle is a segment that joins the center of a circle to a point on the circle. $\overline{TD}$

A **CHORD** is a segment whose endpoints lie on the circle. $\overline{AG}$

A **DIAMETER** is a chord that contains the center. $\overline{CE}$

A **SECANT** is a line that contains a chord. $\overline{AB}$



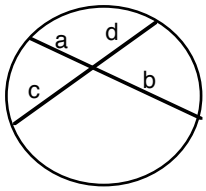
A **TANGENT** to a circle is a line that lies in the plane of the circle and intersects the circle in exactly one point.

Theorem
A tangent to a circle is perpendicular to the radius drawn to the point of tangency. (The converse of that theorem is true also.)

Theorem
A diameter that is perpendicular to a chord bisects the chord and its two arcs.

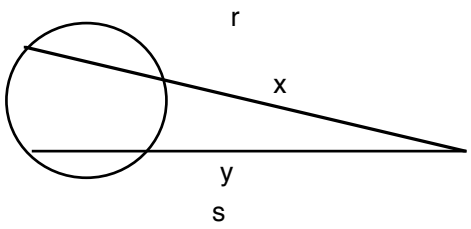
Theorem
In the same or congruent circles, if two chords are congruent, they are equally distant from the center. (Converse is true)

Theorem
When two chords intersect within a circle, the product of the lengths of the segments of one chord is equal to the product of the lengths of the other chord.



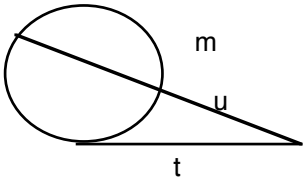
a b = c d

Theorem
If two secants are drawn to a circle from an exterior point, the product of the lengths of one secant and its external segment is equal to the product of the other secant and its external segment.



r x = s y

Theorem
If a tangent and a secant are drawn to a circle from an exterior point, the square of the length of the tangent segment is equal to the product of the lengths of the secant segment and its external segment.



$t^2 = m u$

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