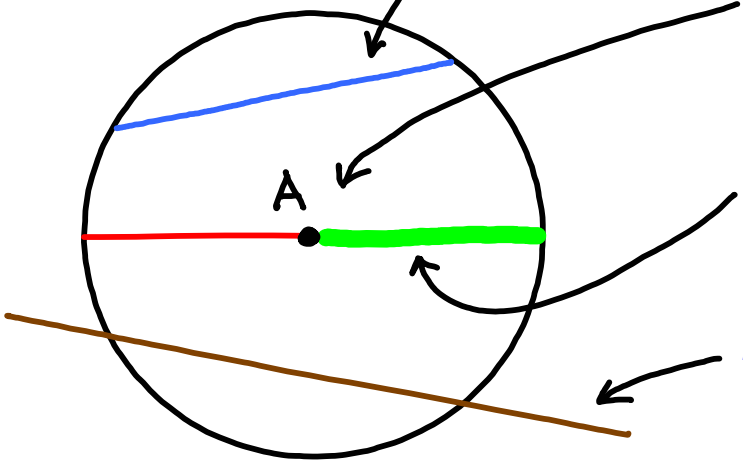
Circles

Chapter Review

Parts of Circles and Tangents

How we name a circle ⊙A (A is center)



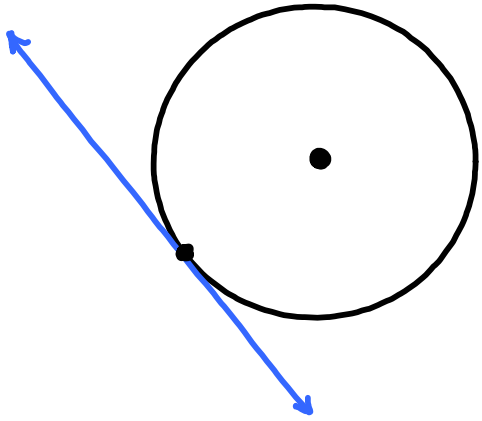
chord - a line segment whose end points lie on a circle

diameter - a chord that passes through the center

radius - line that joins the center to a point on the circle

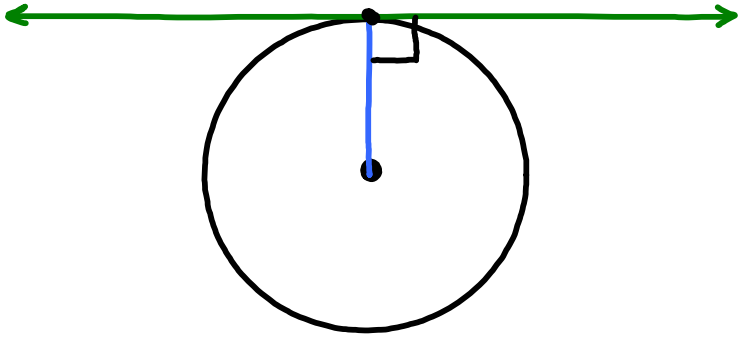
secant - a line that contains a chord

The tangent of a circle

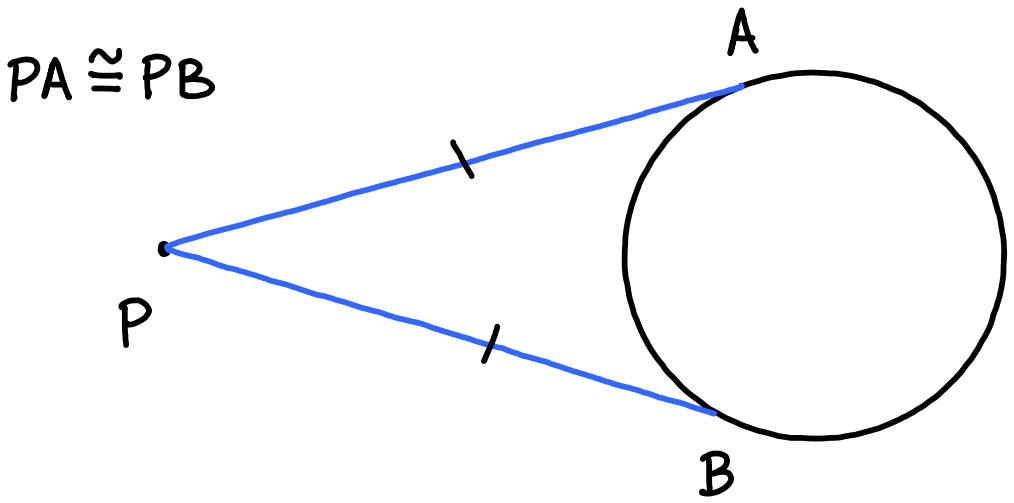


*The **tangent** is a line in the plane of the circle that intersects the circle in exactly one point called the **point of tangency**.*

Important properties of tangents

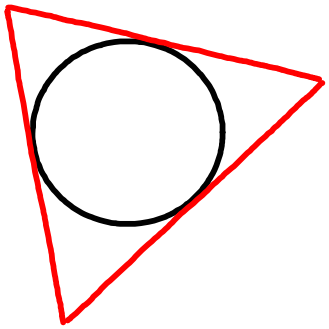


if a line is tangent to a circle, then the line is perpendicular to the radius drawn to the point of tangency



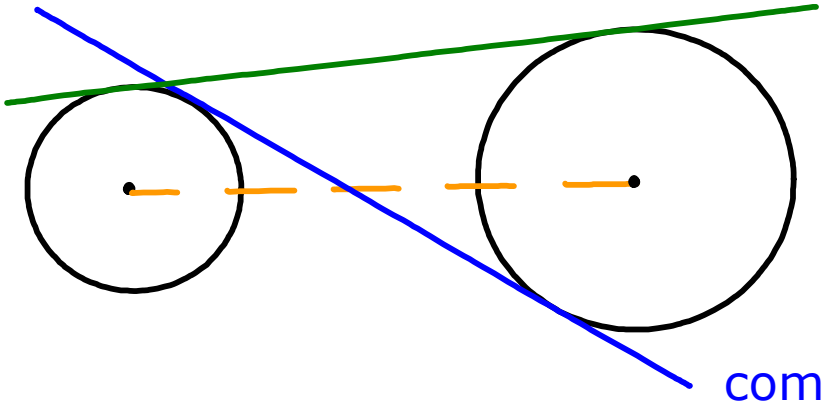
tangents to a circle from the same point are congruent

More terms about circles and tangents

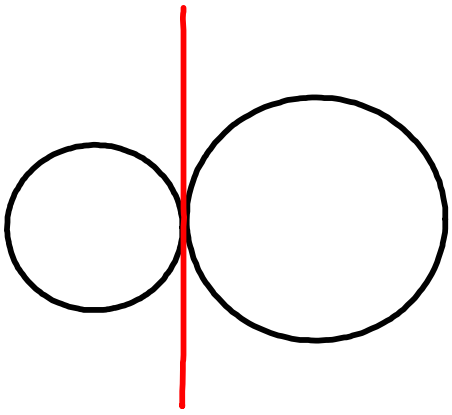


inscribed circle

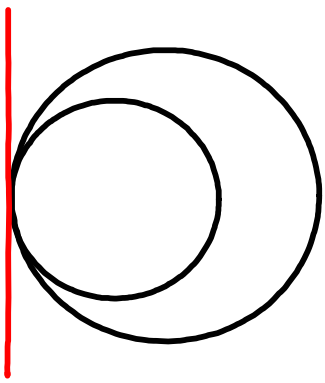
common external tangent



common internal tangent



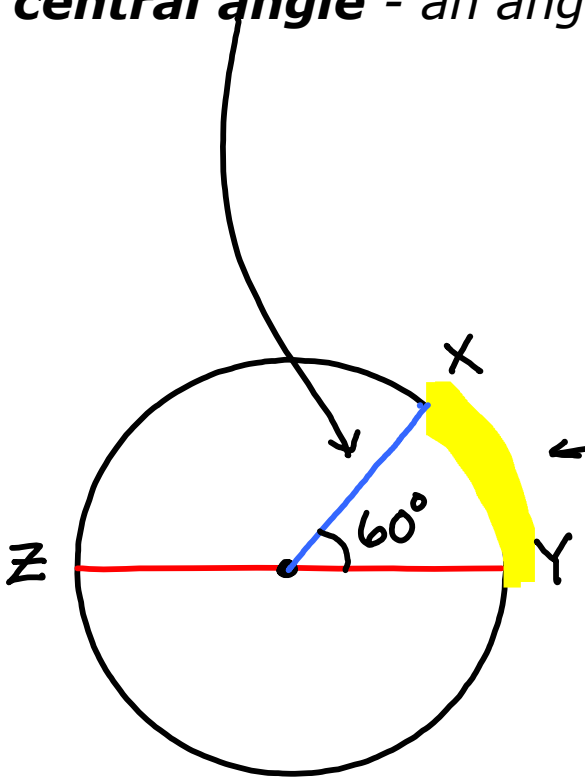
externally tangent



internally tangent

Arcs and Chords

central angle *- an angle with it's vertex at the center*

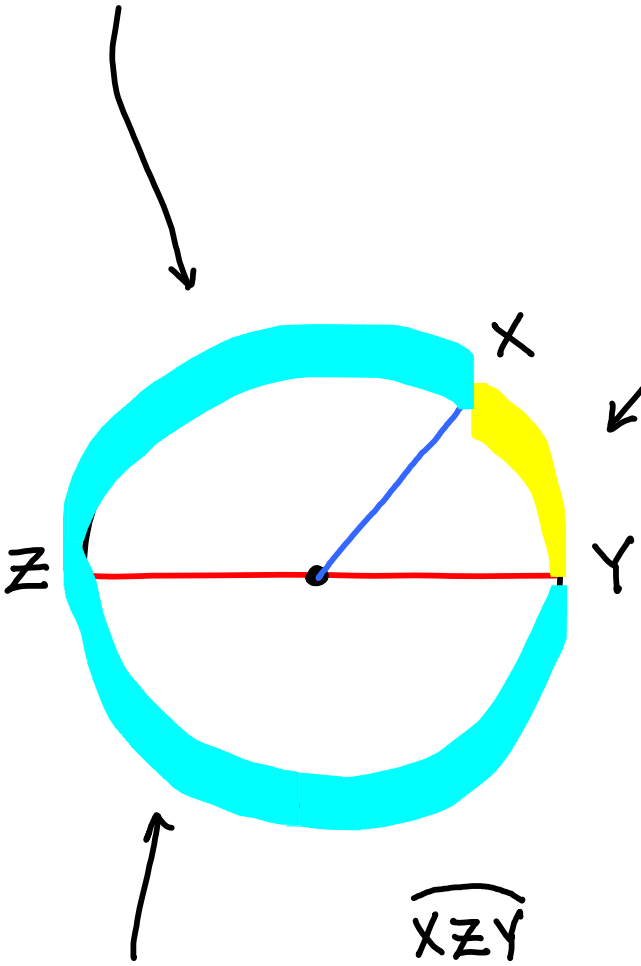


$\overset{\frown}{XY} = 60°$

arc*- part of a circle*

* the measure of an arc is equal to the measure of the central angle

semicircle *- an arc where the end points are on a diameter*

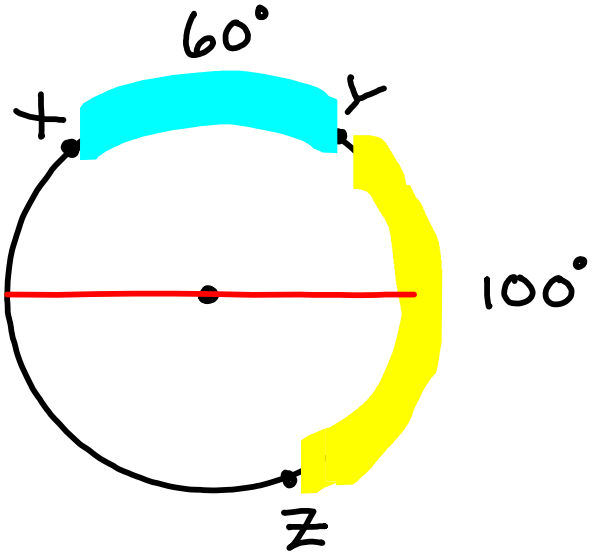


minor arc *- an arc that is less than a semicircle*

major arc *- an arc that is greater than a semicircle*

Properties and theorems about arcs and chords

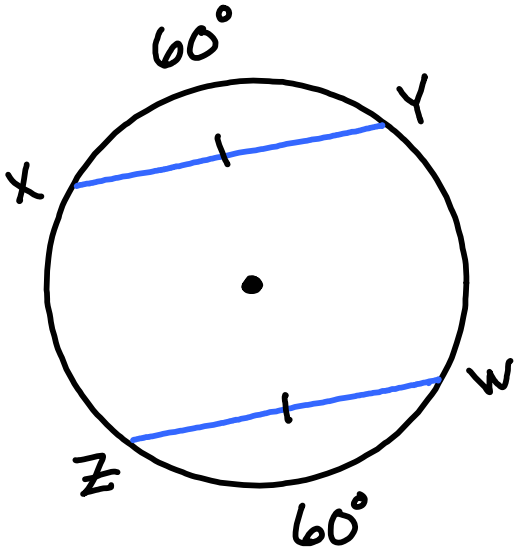
The measure of the arc formed by two adjacent arcs is the sum of the measures of these two arcs



$$\overset{\frown}{XYZ} = \overset{\frown}{XY} + \overset{\frown}{YZ}$$
$$= 60° + 100°$$
$$\overset{\frown}{XYZ} = 160°$$

In the same circle or congruent circles:

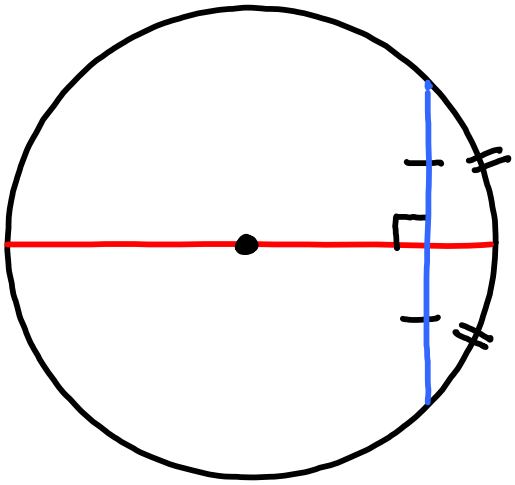
* *Congruent arcs have congruent chords*
* *Congruent chords have congruent arcs*



$\overset{\frown}{XY} \cong \overset{\frown}{ZW}$

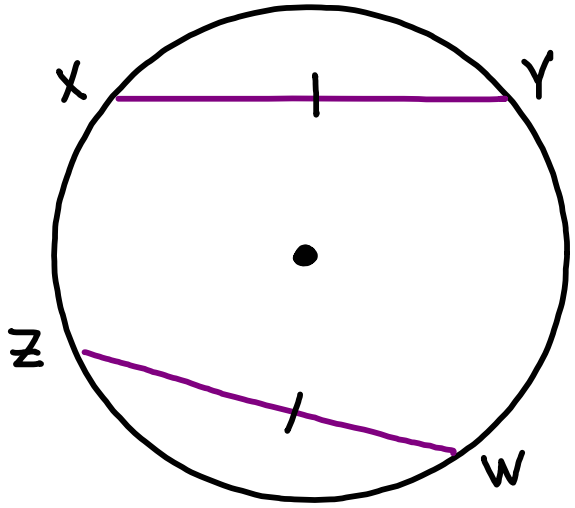
$\overline{XY} = \overline{ZW}$

A diameter that is perpendicular to a chord bisects the chord and its arc



In the same circle or in congruent circles:

* *Chords equally distant from the center are congruent*
* *Congruent chords are equally distant from the center*

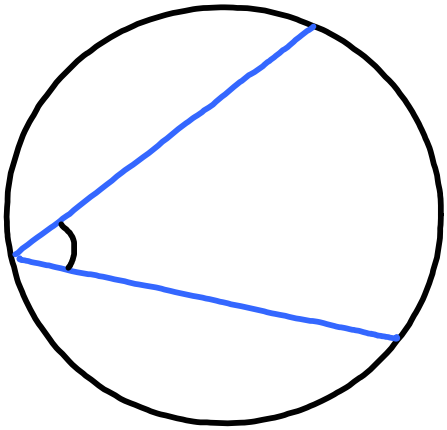


$XY \cong ZW$

XY, ZW are the same distance from the center

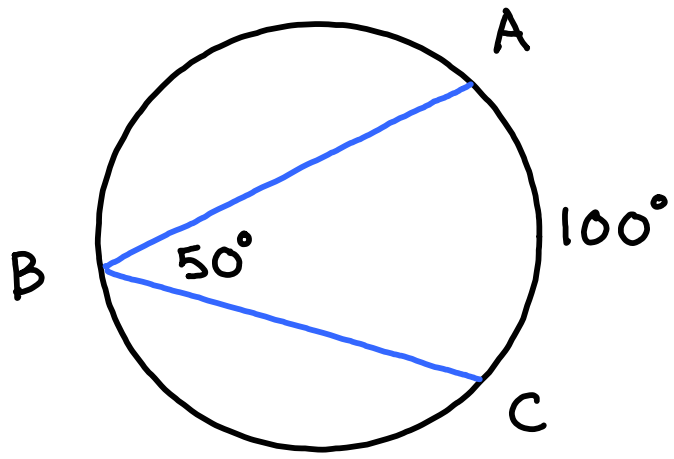
Inscribed Angles

inscribed angle - is an angle whose vertex is on a circle and whose sides contain chords of the circle.



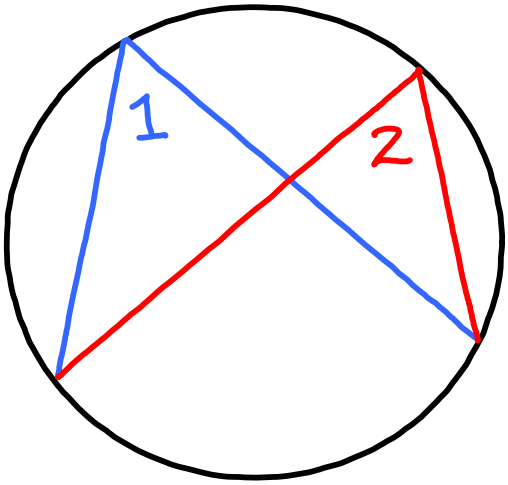
some important theorems and properties of inscribed angles

the measure of an inscribed angle is equal to half the measure of it's intercepted arc



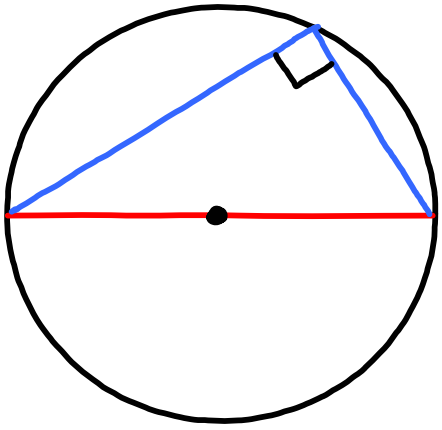
$$m\angle ABC = \frac{1}{2} m\overset{\frown}{AC}$$

if two inscribed angles intercept the same arc, then the angles are congruent

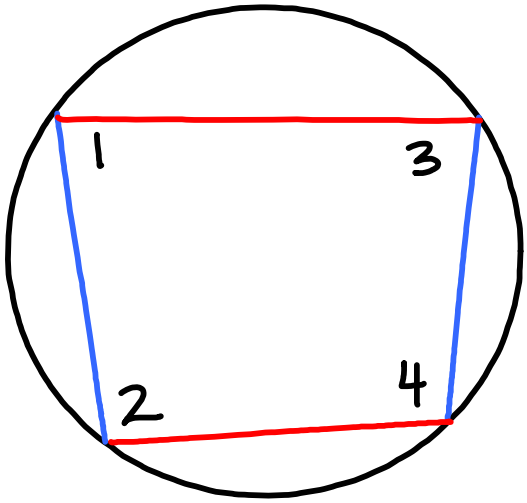


$\angle 1 \cong \angle 2$

an angle inscribed in a semicircle is a right angle



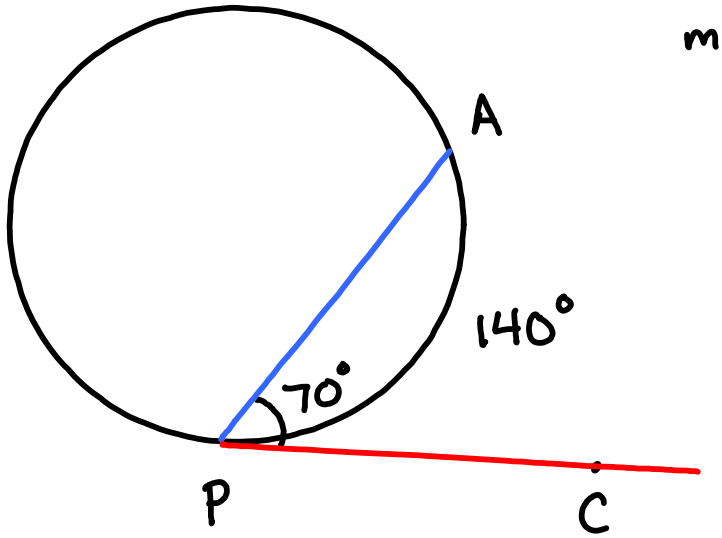
if a quadrilateral is inscribed in a circle, then its opposite angles are supplementary



$\angle 2 + \angle 3 = 180^\circ$

$\angle 1 + \angle 4 = 180^\circ$

the measure of an angle formed by a chord and a tangent is equal to half the measure of the intercepted arc



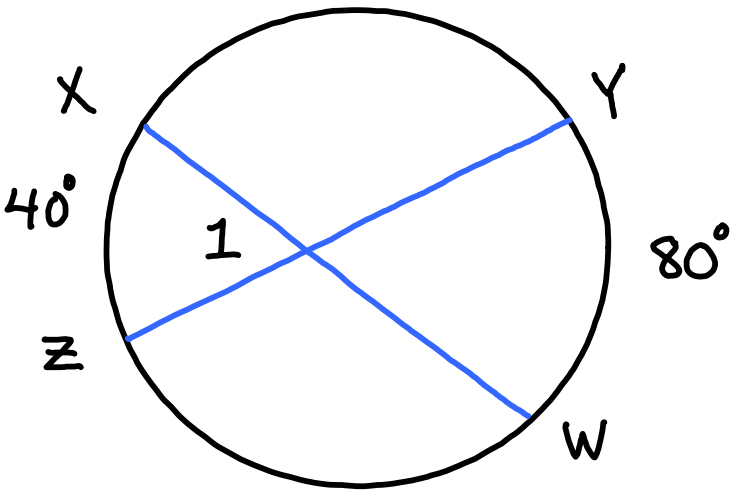
$m\angle APC = \frac{1}{2} m\overset{\frown}{AP}$

Other Angle Relationships in Circles

important theorems and properties of other angles in circles

The measure of an angle formed by two chords that intersect inside a circle is equal to half the sum of the measures of the intercepted arcs.

$$m\angle 1 = \frac{1}{2}(m\overset{\frown}{XZ} + m\overset{\frown}{YW})$$



$$\angle 1 = \frac{1}{2}(40^\circ + 80^\circ)$$

$$\angle 1 = 60^\circ$$

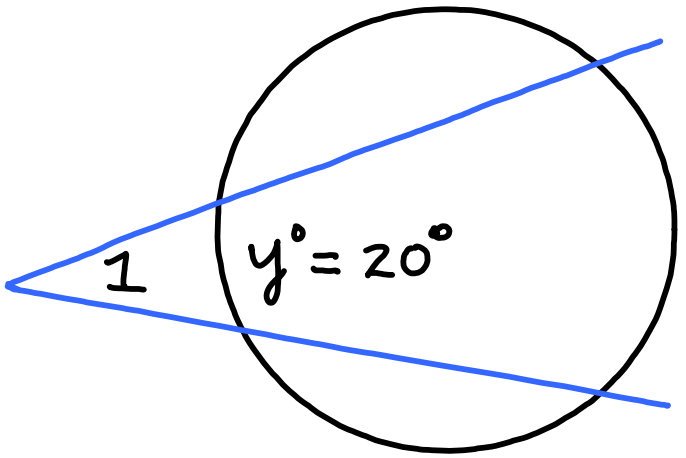
The measure of an angle formed by two secants, two tangents, or a secant and a tangent drawn from a point outside a circle is equal to half the difference of the measures of the intercepted arcs

two secants

$$m\angle 1 = \frac{1}{2}(x - y)$$

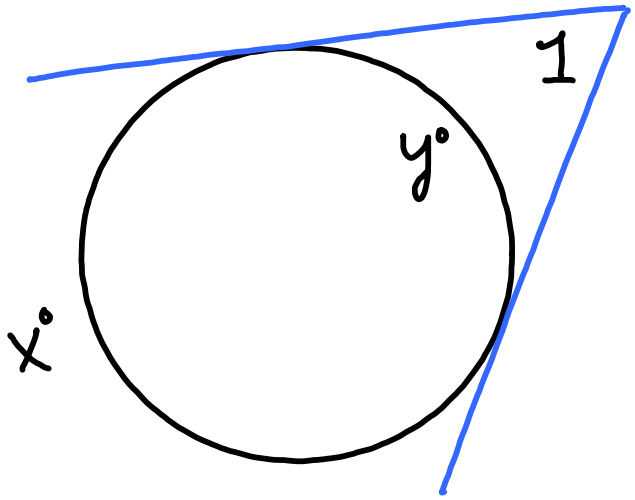
$$\angle 1 = \frac{1}{2}(90 - 20)$$

$$\angle 1 = 35^\circ$$



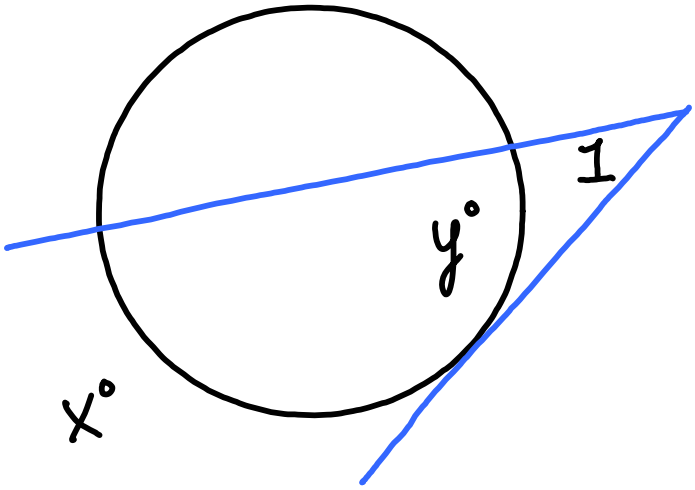
two tangents

$$m\angle 1 = \frac{1}{2}(x-y)$$



secant and a tangent

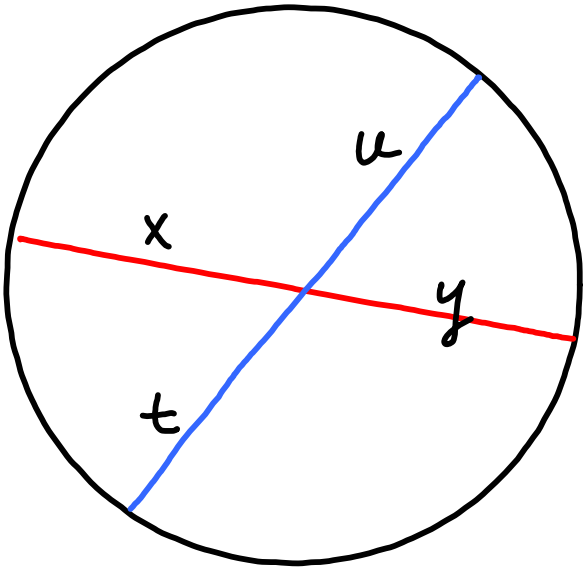
$$m\angle 1 = \frac{1}{2}(x-y)$$



Segment Lengths and Circles

two chords

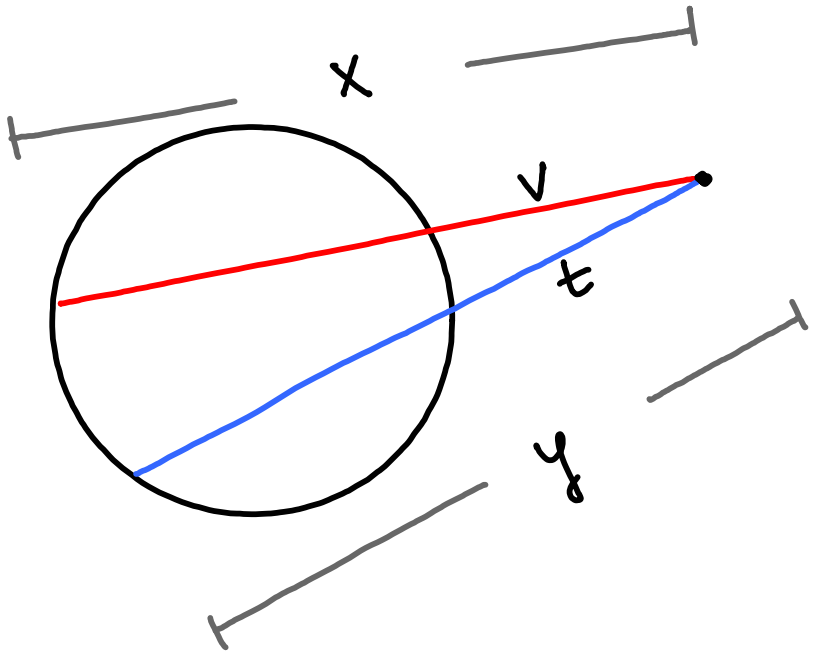
when two chords intersect inside a circle, the product of the segments of one chord equals the product of the segments of the other chord.



$x \cdot y = t \cdot u$

two secants

when two secant segments are drawn to a circle from an external point, the product of one secant segment and its external segment equals the product of the other secant segment and its external segment.



$x \cdot v = y \cdot t$

secant and tangent

when a secant segment and a tangent segment are drawn to a circle from an external point, the product of the secant segment and its external segment is equal to the square of the tangent segment