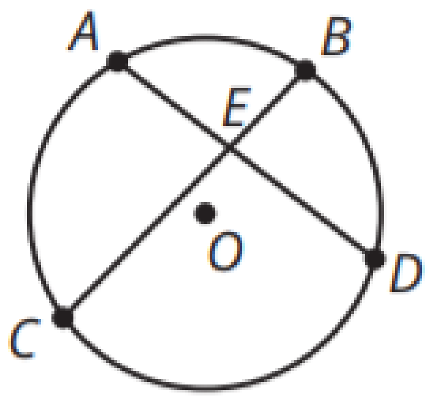
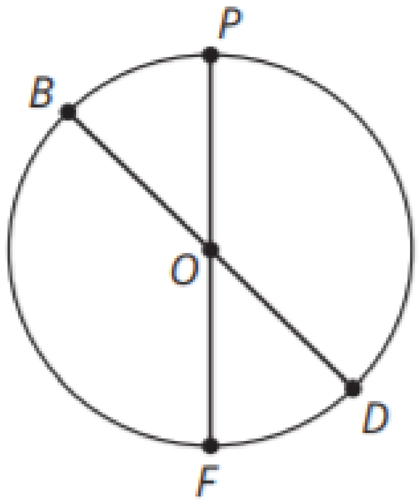
The vertex of an angle can be located inside of a circle, outside of a circle, or on a circle. In this activity, you will explore angles with a vertex located inside of a circle.



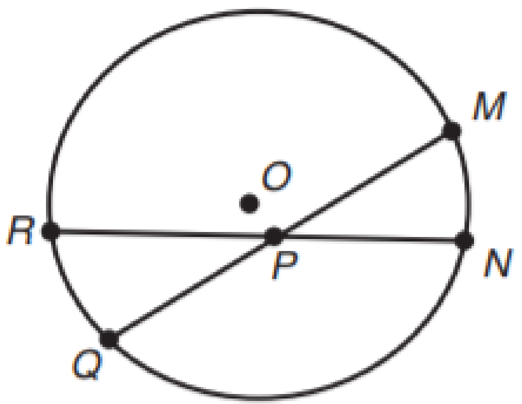
$m\overset{\frown}{BD} = 70°$

$m\overset{\frown}{AC} = 110°$

4. Consider circle *O* with diameters *BD* and *PF*. If $\angle BOP$ and $\angle FOD$ form vertical angles, then $m\angle BOP = \frac{1}{2}(m\widehat{BP} + m\widehat{FD})$. Use reasoning to demonstrate why this is true.

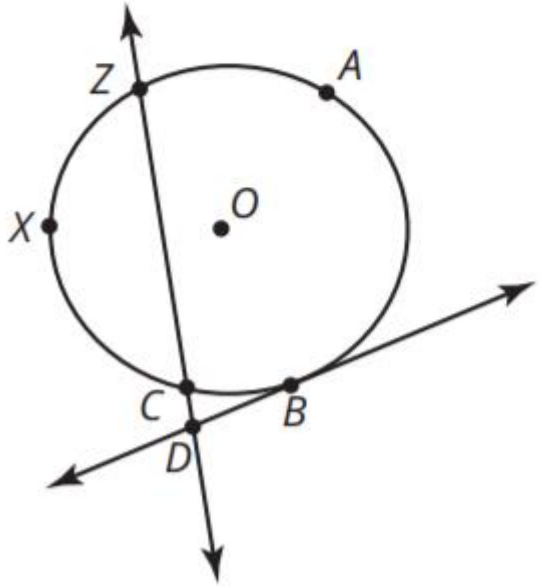


$m\angle RPM$



$$m\angle RPM = \frac{1}{2}\left(m\widehat{RM} + m\widehat{QN}\right)$$

Because you have proved that this conjecture is true, you can now refer to it as a theorem. The **Interior Angles of a Circle Theorem** states: "If an angle is formed by two intersecting chords or secants of a circle such that the vertex of the angle is in the interior of the circle, then the measure of the angle is half of the sum of the measures of the arcs intercepted by the angle and its vertical angle."

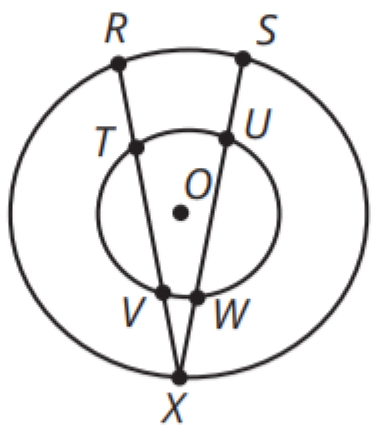


c. **Determine m∠*D*.**

m$\widehat{ZXC}$ = 120°

m$\widehat{CB}$ = 30°

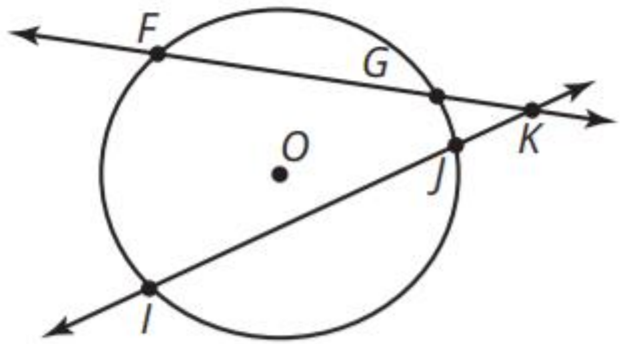
Because you have proved this relationship is true, you can now refer to it as a theorem. The **Exterior Angles of a Circle Theorem** states: "If an angle is formed by two intersecting chords or secants of a circle such that the vertex of the angle is in the exterior of the circle, then the measure of the angle is half of the difference of the measures of the arcs intercepted by the angle."



b. Determine m∠*X*.

m$\widehat{VW}$ = 40°

m$\widehat{TU}$ = 85°



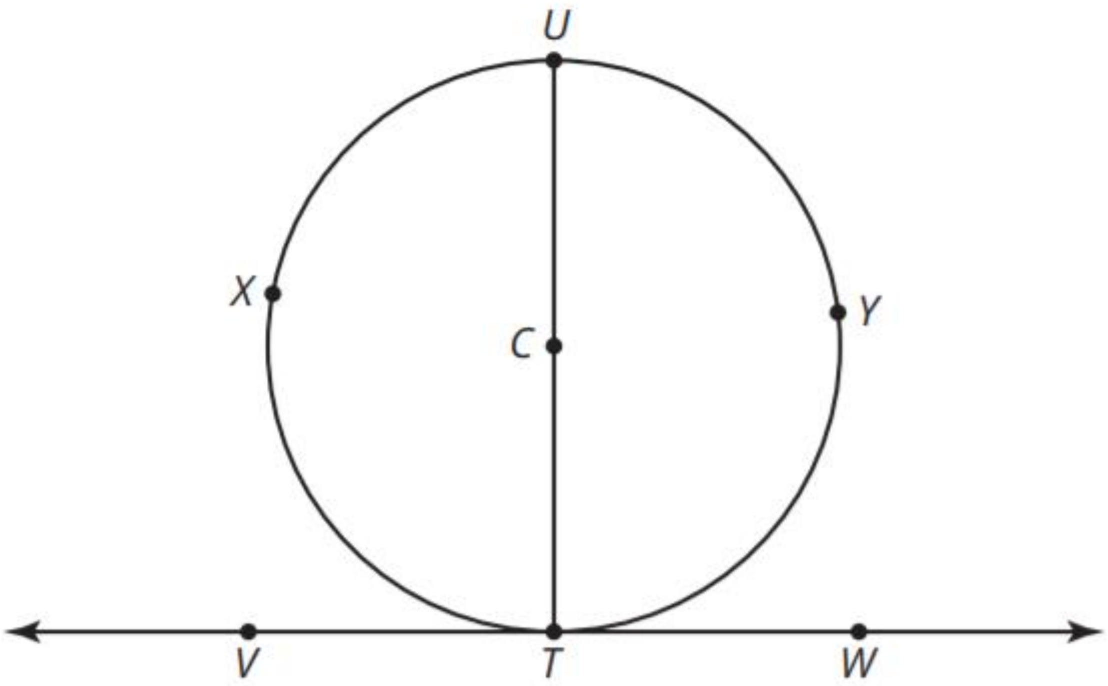
6. Use the diagram shown to determine the measure of each angle or arc.

a. Determine m$\widehat{FI}$.

m∠*K* = 20°

m$\widehat{GJ}$ = 80°

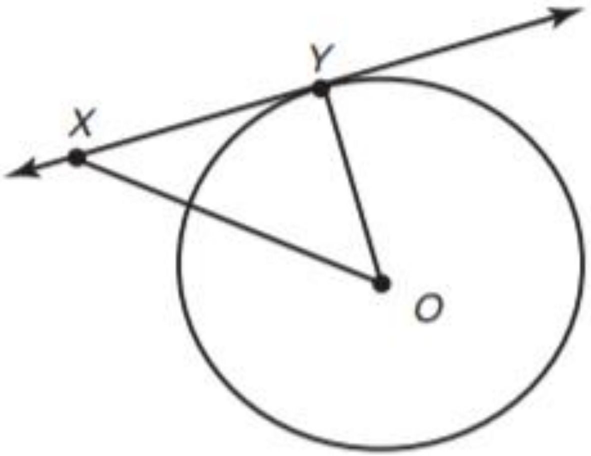
1. Consider $\angle UTV$ with vertex located on circle C. Line VW is drawn tangent to circle C at point T.



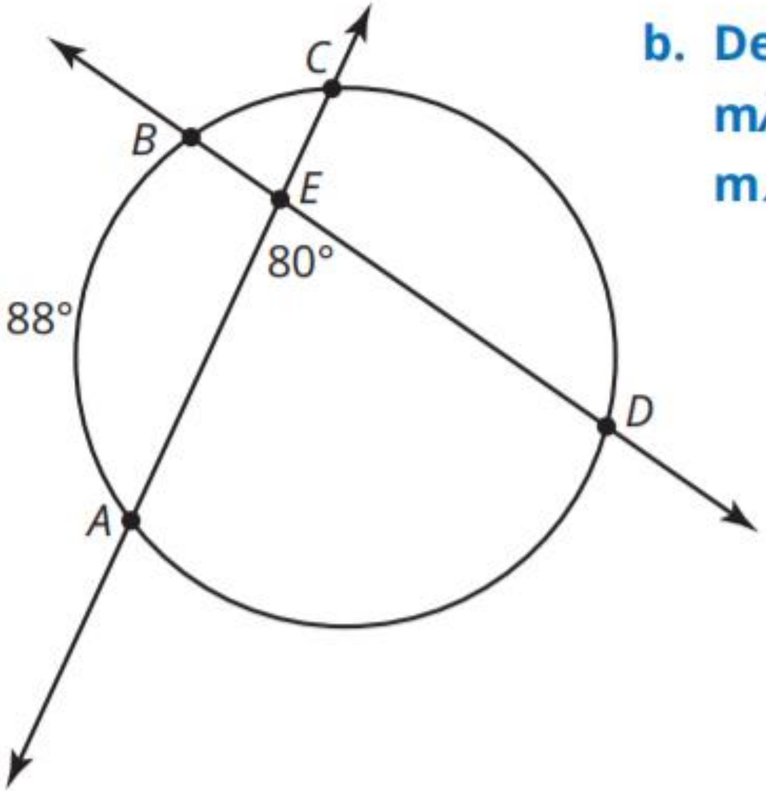
Remember:

An inscribed angle is an angle whose measure is half the measure of its intercepted arc.

If $\overline{YO}$ is a radius, what is the measure of $\angle XYO$?



Because you have proved that this relationship is true, you can now refer to it as a theorem. The **Tangent to a Circle Theorem** states: "A line drawn tangent to a circle is perpendicular to a radius of the circle drawn to the point of tangency."



b. Determine $m\overset{\frown}{CD}$.

$m\overset{\frown}{AB} = 88°$

$m\angle AED = 80°$