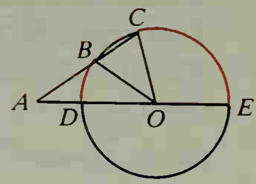
31. $\overline{AC}$ and $\overline{AE}$ are secants of $\odot O$. It is given that $\overline{AB} \cong \overline{OB}$. Discover and prove a relation between the measures of $\overset{\frown}{CE}$ and $\overset{\frown}{BD}$.



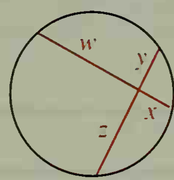
32. Take any point P outside a circle. Draw a tangent segment $\overline{PT}$ and a secant $\overline{PBA}$ with A and B points on the circle. Take K on $\overline{PA}$ so that $PK = PT$. Draw $\overrightarrow{TK}$. Let the intersection of $\overrightarrow{TK}$ with the circle be point X. Discover and prove a relationship between $\overset{\frown}{AX}$ and $\overset{\frown}{XB}$.

Explorations

These exploratory exercises can be done using a computer with a program that draws and measures geometric figures.

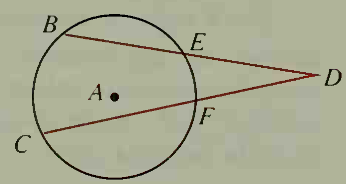
1. Draw a circle. Choose four points on the circle. Draw two intersecting chords using the points as endpoints.

   Measure the lengths of the pieces of the chords and compute the products $w \cdot x$ and $y \cdot z$. What do you notice?



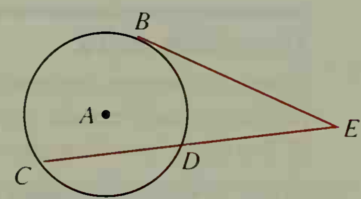
2. Draw any circle A. Choose two points B and C on the circle and a point D outside the circle. Draw secants $\overline{BD}$ and $\overline{CD}$. Label their intersections with the circle as E and F.

   Measure and compute $DE \cdot DB$ and $DF \cdot DC$. What do you notice?



3. Draw any circle A. Choose three points B, C, and D on the circle. Draw a tangent to the circle through point B that intersects $\overleftrightarrow{CD}$ at a point E.

   Measure and compute $(BE)^2$ and $ED \cdot CE$. What do you notice?



9-7 Circles and Lengths of Segments

You can use similar triangles to prove that lengths of chords, secants, and tangents are related in interesting ways.

In the figure at the right, chords $\overline{AB}$ and $\overline{CD}$ intersect inside $\odot O$. $\overline{AP}$ and $\overline{PB}$ are called *the segments of chord* $\overline{AB}$. As we did with the terms "radius" and "diameter" we will use the phrase "segment of a chord" to refer to the length of a segment as well as to the segment itself.