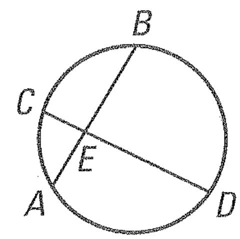
12-6: Segment Relationships in Circles

When two chords intersect inside a circle, each chord is divided into two segments called **segments of a chord**.

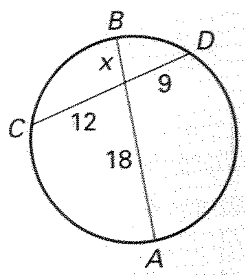
Theorem:

If two chords ***intersect inside*** a circle, then the product of the segment lengths of one chord is equal to the product of the segment lengths of the other chord.

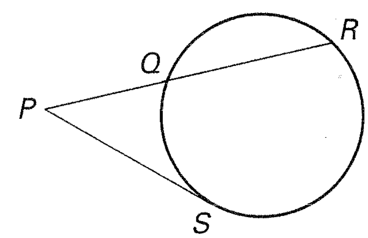
$$EA \bullet EB = EC \bullet ED$$



EX 1) Find the value of x.



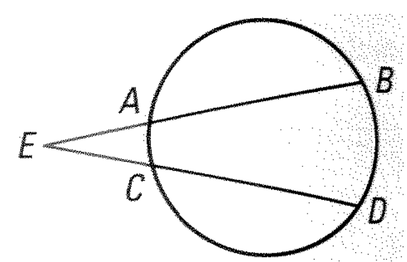
In the figure, $\overline{PS}$ is a **tangent segment** because it is tangent to the circle at an endpoint (S). $\overline{PR}$ is a **secant segment** because one of the two intersection points with the circle is an endpoint (R). $\overline{PQ}$ is the **external segment** of $\overline{PR}$.



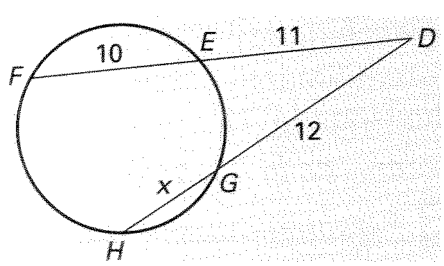
Theorem:

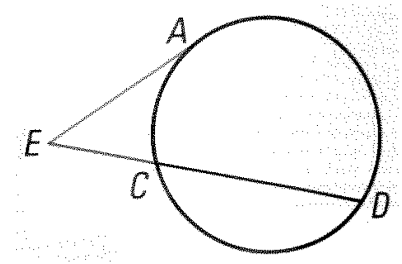
If two secant segments share the same endpoint outside a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.

$$EA \bullet EB = EC \bullet ED$$

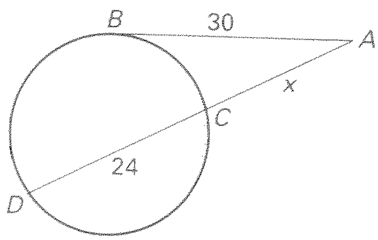


EX 2) Find the value of x.



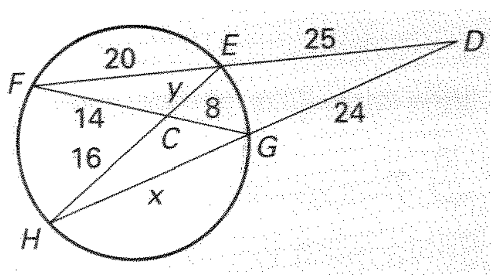
Theorem: If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the lengths of the secant segment and its external segment equals the square of the length of the tangent segment. $(EA)^2 = EC \bullet ED$	

EX 3) Find the value of *x*.



<u>Challenge</u>:

EX 4) Find the value of *x* and *y*.



EX 5) Is $\overline{BC}$ a diameter of the circle? (Hint: What do you recall about a radius intersecting a tangent at the point of tangency?)