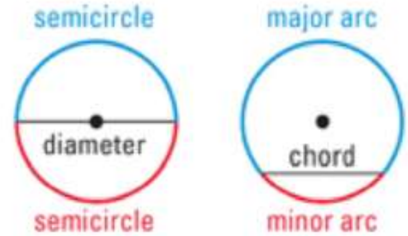
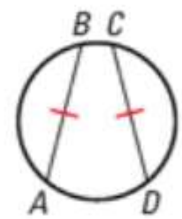
10.3 Apply Properties of Chords

Recall that a *chord* is a segment with endpoints on a circle. Because its endpoints lie on the circle, any chord divides the circle into two arcs. A diameter divides a circle into two semicircles. Any other chord divides a circle into a minor arc and a major arc.



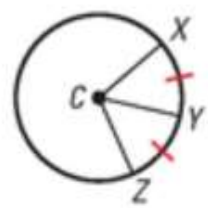
THEOREM 10.3

In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.



$\widehat{AB} \cong \widehat{CD}$ if and only if $\overline{AB} \cong \overline{CD}$.

BISECTING ARCS If $\widehat{XY} \cong \widehat{YZ}$, then the point Y, and any line, segment, or ray that contains Y, *bisects* $\widehat{XYZ}$.

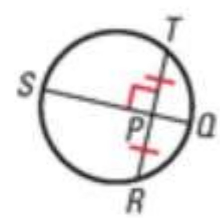


$\overline{CY}$ bisects $\widehat{XYZ}$.

THEOREM 10.4

If one chord is a perpendicular bisector of another chord, then the first chord is a diameter.

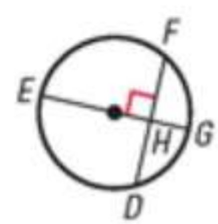
If $\overline{QS}$ is a perpendicular bisector of $\overline{TR}$, then $\overline{QS}$ is a diameter of the circle.



THEOREM 10.5

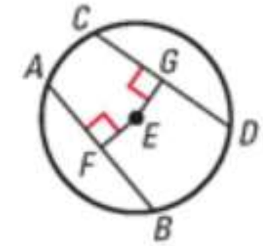
If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.

If $\overline{EG}$ is a diameter and $\overline{EG} \perp \overline{DF}$, then $\overline{HD} \cong \overline{HF}$ and $\widehat{GD} \cong \widehat{GF}$.



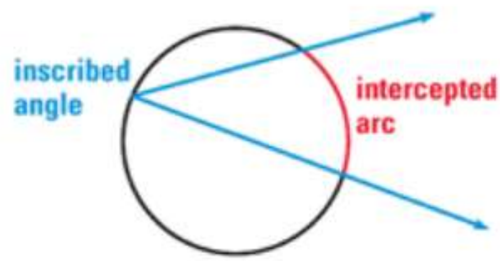
THEOREM 10.6

In the same circle, or in congruent circles, two chords are congruent if and only if they are equidistant from the center.



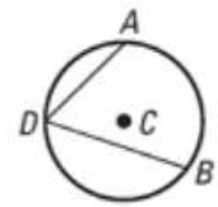
$\overline{AB} \cong \overline{CD}$ if and only if $EF = EG$.

An **inscribed angle** is an angle whose vertex is on a circle and whose sides contain chords of the circle. The arc that lies in the interior of an inscribed angle and has endpoints on the angle is called the **intercepted arc** of the angle.



THEOREM 10.7 Measure of an Inscribed Angle Theorem

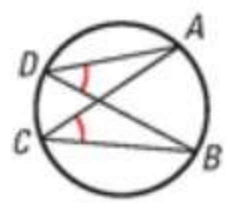
The measure of an inscribed angle is one half the measure of its intercepted arc.



$m\angle ADB = \frac{1}{2}m\widehat{AB}$

THEOREM 10.8

If two inscribed angles of a circle intercept the same arc, then the angles are congruent.



$\angle ADB \cong \angle ACB$

THEOREM 10.10

A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.

D, E, F, and G lie on $\odot C$ if and only if $m\angle D + m\angle F = m\angle E + m\angle G = 180°$.