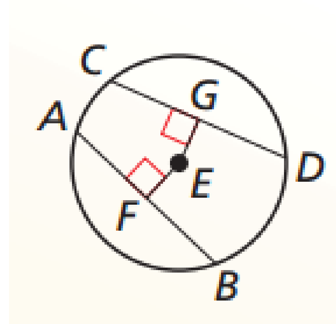
Equidistant Chords Theorem

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



PROOF:

"p → q" If two chords are congruent in the same circle or two congruent circles, then they are equidistant from the center

Statements	**Reasons**
$\overline{AB} \cong \overline{CD}$ in $\odot E$	Given
Draw $\overline{EA}$, $\overline{EB}$, $\overline{EC}$ and $\overline{ED}$	Through any two points there is one line
$\overline{EA} \cong \overline{EB} \cong \overline{EC} \cong \overline{ED}$	Radii in the same circle are congruent
$\Delta EAB \cong \Delta ECD$	SSS≅
Draw the altitudes of the isosceles triangles. Let $\overline{EF}$ be the altitude in ΔEAB and $\overline{EG}$ be the altitude in ΔECD	Existence of altitudes
$\overline{EF} \perp \overline{AB}$ and $\overline{EG} \perp \overline{CD}$	Definition of an altitude
$\angle EFA, \angle EFB, \angle EGD$ and $\angle EGC$ are right angles	Definition of perpendicular lines/segments
$\angle EFA \cong \angle EFB \cong \angle EGC \cong \angle EGD$	All right angles are congruent
$\Delta EFA \cong \Delta EFB \cong \Delta EGC \cong \Delta EGD$	AAS≅
$\overline{EH} \cong \overline{EF}$	CPCTC
EH = EF	Congruent segments are equal
$\overline{AB}$ and $\overline{CD}$ are equidistant from the center of the circle, E	Definition of equidistant

"q → p" If two chords are equidistant from the center of a circle in the same circle or congruent circles, then the chords are congruent.

Will post soon!