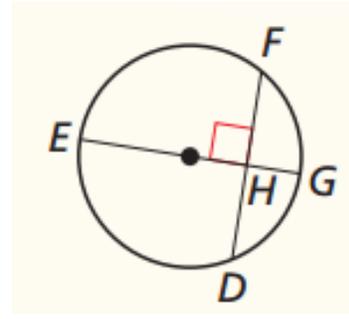


Perpendicular Chord Bisector Theorem

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

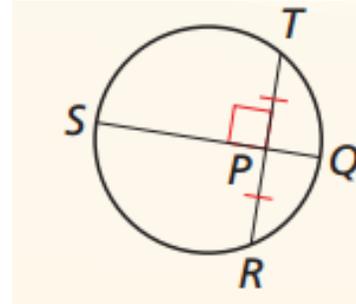


PROOF:

Statements	Reasons
$\overline{EG} \perp \overline{FH}$	Given
Say O is the center of the circle. Draw \overline{OF} and \overline{OD}	Through any two points there is one line
$\overline{OF} \cong \overline{OD}$	Radii in the same circle are congruent
$\overline{OH} \cong \overline{OH}$	Reflex. Prop. \cong
$\angle OHF$ and $\angle OHD$ are right angles	Definition of perpendicular segments/lines
$\triangle OHF$ and $\triangle OHD$ are right triangles	Definition of a right triangle
$\triangle OHF \cong \triangle OHD$	HL \cong
$\overline{FH} \cong \overline{DH}$	CPCTC
\overline{EG} bisects \overline{FD}	Definition of a segments bisector (H is the midpoint since the segments are congruent on either side of this point in the same segment)
$\angle HOD \cong \angle HOF$	CPCTC
$\widehat{FG} \cong \widehat{DG}$	Congruent Central Angles Theorem
\overline{EG} bisects \widehat{FD}	The arcs on either side of G are congruent

Perpendicular Chord Bisector Converse

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



PROOF:

Statements	Reasons
\overline{SQ} is the perpendicular bisector of \overline{TR} in the circle	Given
Plot L, the center of the circle. Draw \overline{LT} and \overline{LR}	Through any two points there is one line
$\overline{LT} \cong \overline{LR}$	Radii in the same circle are congruent
$\overline{TP} \cong \overline{RP}$	Definition of a segment bisector (<i>from the perpendicular bisector given</i>)
$\overline{LP} \cong \overline{LP}$	Reflex. Prop. \cong
$\triangle LPR \cong \triangle LPT$	SSS \cong
$\angle LPR \cong \angle LPT$	CPCTC
$\overline{LP} \perp \overline{TR}$	Linear Pair Perpendicular Theorem
L is on the perpendicular bisector of \overline{TR} , and thus L lies on \overline{QS}	Definition of perpendicular lines/segments
\overline{QS} is a diameter of the circle	Definition of a diameter (<i>chord \overline{QS} contains the center of the circle</i>)