Geometry Honors
Chapter : Circles

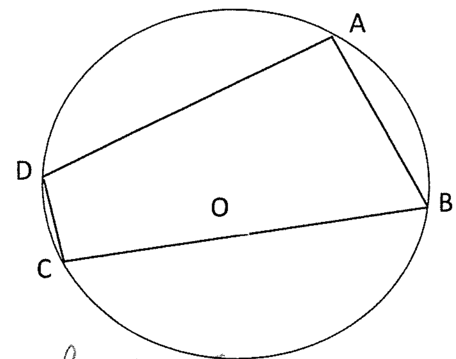
Name ___________________
Date ___________________

Proving the Inscribed Quadrilateral Theorem

Inscribed Quadrilateral Theorem:
If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.

Given: ABCD is inscribed in circle O.

Prove: ∠A and ∠C are supplementary.
∠B and ∠D are supplementary.



Statements	Reasons
① Union of $\overset{\frown}{BCD}$ and $\overset{\frown}{DAB}$ is circle O.	① A whole is equal to sum of its parts. or Arc Addition Postulat
② $m\overset{\frown}{BCD} + m\overset{\frown}{DAB} = 360°$	② Substitution.
③ ∡A is an inscribed ∡ and its intercepted arc is $\overset{\frown}{BCD}$. ∡C is an inscribed ∡ and its intercepted arc is $\overset{\frown}{DAB}$.	③ Definition of inscribed ∡ and intercepted arc.
④ $m\angle A = \frac{1}{2} m\overset{\frown}{BCD}$ $m\angle C = \frac{1}{2} m\overset{\frown}{DAB}$	④ An inscribed ∡ is $\frac{1}{2}$ of its intercepted arc.
⑤ $m\angle A + m\angle C = \frac{1}{2} m\overset{\frown}{BCD} + \frac{1}{2} m\overset{\frown}{DAB}$	⑤ Add. Property
⑥ $= \frac{1}{2}(m\overset{\frown}{BCD} + m\overset{\frown}{DAB})$	⑥ Distributive Prop.
⑦ $= \frac{1}{2}(360)$	⑦ Substitution Prop.
⑧ $m\angle A + m\angle C = 180°$	← Repeat Steps #1-8 using $\overset{\frown}{ABC}$ + $\overset{\frown}{ADC}$

The converse of the Inscribed Quadrilateral Theorem is also true.

Theorem: If the opposite angles of a quadrilateral are supplementary, then the quadrilateral can be inscribed in a circle.