LessonTitle: More Circle Conjecture & Proof	**Geo 4.4**
Utah State Core Standard and Indicators Geometry Standards 3, 4 Process Standards 1-4	
Summary In this lesson students use formal proofs to explore 1) whether or not the inscribed angle conjecture works in all cases for inscribed angles, 2) inscribed angles that intersect the same arc are congruent, 3) inscribed angles in a semicircle are right angles, 4) parallel lines intercept congruent arcs on a circle, 5) other relationships and properties regarding intersecting chords, secants, and tangents.	
Enduring Understanding We can show proofs for geometric conjectures about circle properties by using established definitions and previously proven properties.	**Essential Questions** How can we prove accepted circle properties? Why are these properties important? How do they help us?
Skill Focus • Geometric conjecture and proof of properties.	**Vocabulary Focus**
Assessment	
Materials: Geometer's Sketchpad and manual drawing and measuring tools.	
Launch	
Explore • Does the inscribed angle conjecture work in all possible cases for inscribed angles? • How can we prove that 1) inscribed angles that intersect the same arc are congruent 2) inscribed angles in a semicircle are right angles, 3) parallel lines intercept congruent arcs on a circle? • What kinds of relationships and properties can we show relating intersecting chords, intersecting secants and an intersecting tangent and secant?	
Summarize	
Apply	

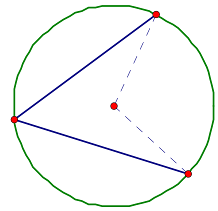
Directions:
Have students share and evaluate the validity of each other's approach to proving and showing evidence to support conjectures.

Students may wish to prove other relationships in the examples given below.

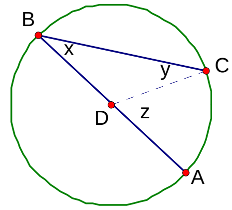
Geo 4.4 More Circle Conjecture Proofs

You may use Geometer's Sketchpad or any other tool available to show the following proofs. Record the necessary steps.

Part I Proving The Inscribed Angle Conjecture:
The measure of an angle inscribed in a circle equals half the measure of its intercepted arc.

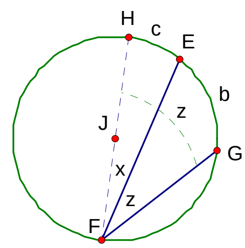


Case 1: The circle's center is on the angle.
Given: A circle with inscribed angle ABC and angles x, y, z.
Show: Angle ABC = ½ mCA



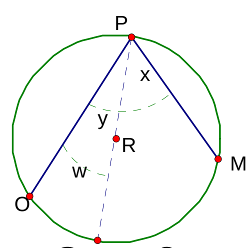
Case 1

Case 2: The Center of the circle is outside the angle.
Given: A circle with inscribed angle EFG on one side of diameter FH. c = mHE, b = mEG
Show: measure of angle EFG = ½ mEG



Case 2

Case 3: The center of the circle is inside the angle.
Given: A circle with inscribed angle MPO whose sides PM and OP lie on either side of diameter PR
Show: The measure of angle MPO = 1/2mMO



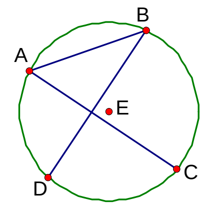
Case 3

Does the inscribed angle conjecture work in all possible cases for inscribed angles?

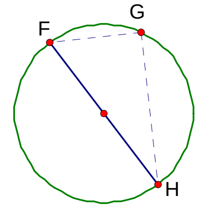
Part II More Inscribed Angle Connections.

In the following problems, determine what is given and what you need to prove. Then show the proof.

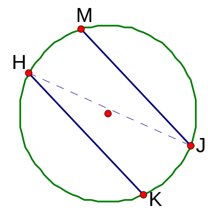
1) Inscribed angles that intercept the same arc are congruent.
   Given:
   Show:



2) Angles inscribed in a semicircle are right angles.
   Given:
   Show:

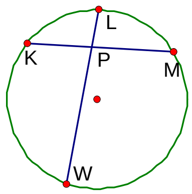


3) Parallel lines intercept congruent arcs on a circle.
   Given:
   Show: JK is congruent to MH

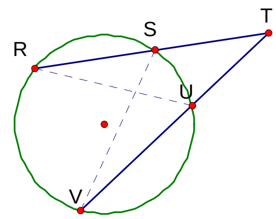


Part III More Connections with chords, secants and tangents.

4) Interior Intersecting Chords
   Given: Chords LW and KM.
   Determine the products of KP*PM and LP*PW.
   What do you observe?
   Try this with three more circles and different sized chords.
   What are your observations?



4) Given Secants RT and VU.
   Prove: RT*ST = VT*UT (Hint: Use RU and VS)



5) Given NO is tangent to the circle. PO is a secant segment.
   Prove: $(NO)^2$ = OP*OM. (Hint: draw NP and NM)