Inscribed Angles

Key Words: Circles, Inscribed Angles, Arcs

Summary: Given an inscribed angle in a circle, the student will discover the relationship between an inscribed angle and its intercepted arc.

Existing Knowledge: Student has knowledge of central angles and the measurement of its intercepted arc. Also, we accept that the student has at least a basic knowledge of the working properties of Cabri II.

NCTM Standards: Analyze characteristics and properties of two- and three-dimensional shapes and develop mathematical arguments about geometric relationships.

Learning Objective: To recognize and find measures of inscribed angles.

Materials Needed: Computers with Cabri Geometry II, and lab worksheet.

Procedures: 1. Group students in pairs 2. Proceed with lab worksheet

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Lab: Inscribed Angles

Team Members’ Names: ________________________________ Date________________

File Name:________________________________________

Goal(s): To find the measure of an inscribed angle and to make a conjecture.

Procedures:

1. Draw a circle and label the center O. (Use the Circle Tool)
2. Locate a point A on circle O.
3. Draw segment $\overline{OA}$. (Use the Segment Tool)
4. Draw a line perpendicular to segment $\overline{OA}$ that passes through point O, and label one of the points of intersection with the circle, B. (Use the perpendicular line Tool)
5. Create segment $\overline{OB}$ and hide the perpendicular line that you created in step 4. (Use the Hide/Show Cabri tool)

6. Name the measure of $\angle AOB$. _________(Use Angle Measure Tool)
7. Name the intercepted arc of $\angle AOB$. ______________
8. What is the degree measure of arc $\overline{AB}$? _____________ (Label the arc)
9. Locate a point on circle O not in arc $\overline{AB}$, and label it C.
10. Draw segments $\overline{AC}$ and $\overline{BC}$. Thicken or color the segments to create a different look from segments $\overline{OB}$ and $\overline{OA}$.

(Use Thicken or Color Tool)

11. Measure $\angle ACB$ using the Cabri angle measure tool.

12. What is the intercepted arc of $\angle ACB$? _____________

13. What do you notice about the measure of $\angle ACB$ in relation to its intercepted arc $\overline{AB}$?

14. Grab point C and move it around the circumference of the circle. What happened to the angle measure?

15. Make a conjecture.

16. Let’s test your conjecture. Bisect $\angle AOB$. Label the point of intersection with the circle as D. (Use Angle Bisector tool)

17. Create segment $\overline{OD}$ and hide the line $\overline{OD}$. (Use Segment Tool and Hide/Show Tool)
18. Measure $\angle BOD$ and label arc $\overarc{BD}$ with its degree measure. 
(Use Angle Measure and Label Tools)

19. Locate a point “E” on circle O not on arc $\overarc{AB}$.

20. Draw segments $\overline{BE}$ and $\overline{DE}$. Choose a dashed line pattern for these segments in order to create a different look from the other. 
(Use Dotted Tool)

21. If your conjecture is correct, what is the measure of $\angle BED$? 
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22. Now measure $\angle BED$ using the Cabri angle measure tool in order to confirm your conjecture.

23. Now try these:
Extension: Tallmadge Circle Traffic Problem

Eight streets intersect at Tallmadge Circle. Traffic flows in a counterclockwise direction. What arc degree measure describes leaving route 91 south to enter route 261 northeast? Streets that appear to be 90 degrees and 45 degrees are such.
Solutions:

6.  90 degrees

7.  Arc $\widehat{AB}$

8.  90 degrees

12. Arc $\widehat{AB}$

13. The angle measure is half the measure of the intercepted arc.

14. The angle measure remains the same.

15. The measure of an inscribed angle is equal to one-half the measure of the intercepted arc.

21. 22.5 degrees

23. $X = 80$ degrees, $X = 44$ degrees

Tallmadge Circle Problem: 135 degrees