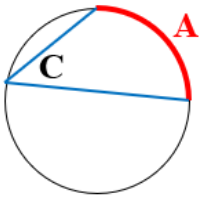
10th Grade Assignment – Week #8

Group Assignment:

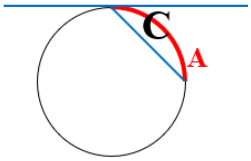
for Tuesday. See how many of the below theorems you can discover!

- **Inscribed Angle Theorem**
  Draw a circle and an angle that is inscribed within that circle (i.e., the vertex of the angle sits on the circle). With a protractor, measure **both the angle (C) and the arc (A)** that it subtends. (Don't forget that in order to measure the size of the arc, you need to use a protractor to measure the angle formed by drawing lines from the center of the circle to the ends of the arc.) Everyone in the group should do this twice, using two different circles.

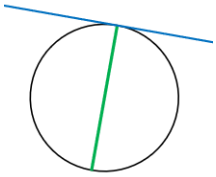


  1) After sharing results with each other, see if you can discover a formula relating the measure of the angle (C) and the arc (A).
  2) Give an explanation for why this must be true.
  3) If the arc is 180°, then what can be said about the angle (C)?
  4) What is the name of the theorem that makes a statement about the above special case?

- **Chord-Tangent Theorem**
  Draw a circle and a tangent to that circle. From this point of tangency draw a chord. What can be said about the relationship of the angle (C) formed by the intersection of the chord and the tangent, and the arc (A) inside this angle? Give an explanation for why this must be true.

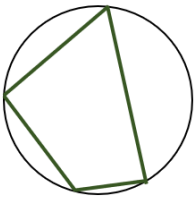


- **Diameter-Tangent Th.**
  What can be said about the angle formed by a tangent to a circle and the diameter drawn from that point of tangency? Give an explanation for why this must be true.

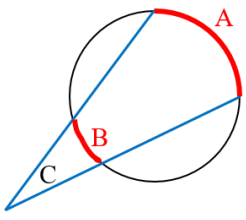


for Thursday

- **Inscribed Quadrilateral Theorem**
  Draw a circle, choose any four points on the circle and then connect them in order to create a quadrilateral. Of course, we already know that the angles inside the quadrilateral must add to 360°. What additional (and surprising!) theorem can be stated about the angles of any quadrilateral that is inscribed within a circle?



- *Challenge!* **Outside Angle Theorem**
  Draw two secants that cross through a circle and intersect each other outside the circle. We now have an angle (C) that has its vertex outside the circle and subtends two arcs (A and B) of the circle. Give a formula that relates A, B, and C.



Individual Work

- **Circle Geometry**. If you wish, continue trying to discover any of the theorems from the above group assignment (that your group didn't complete).
- **Triangle Geometry.**

  Notes for this "Triangle Geometry" unit:

  - This is a very different unit! You will be creating many drawings, and the results will often be quite surprising.
  - You will need the following tools for this unit: compass, straight edge, protractor, (plastic) drawing right triangle, colored pencils.
  - **Indicates that the drawing should be done neatly on a full, clean sheet of paper.
  - You may wish to keep your drawings in a *Triangle Book (*something like a "main lesson book").
  - ***The Four Centers of a Triangle*.

    During Wednesday's lecture, I gave four different methods for finding the center of a triangle. Usually, each of these methods give us a different point as the center.

    On a separate sheet of paper, draw a large, acute (all angles less than 90°) scalene triangle. Find each of the four centers of the triangle. Show all construction lines lightly in lead pencil, and indicate each of the centers clearly with a different color or symbol. Now do the same with an obtuse triangle on another sheet. (For best results, have the largest angle around 130°.)