6.8.2: Criss-Crossing the Circle

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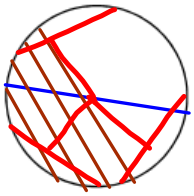
Through the technique of paper folding you will discover several properties of circles.

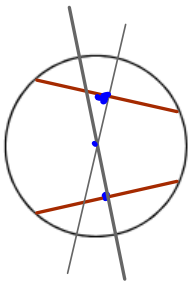
Part 1: Chords of a Circle

(some word choices for the blanks: bisects, equal, centre, equidistant, equal, decreases, increases)

Instructions	Sketch
○ cut out the circle from the circle template given ○ find the centre of the circle using two diameters ○ draw several lines (chords) parallel to one of these diameter folds	

Properties:

- Which chord is the longest chord? diameter
- Complete the following statement:
  "As the length of the chord increases, the distance from the centre decreases."

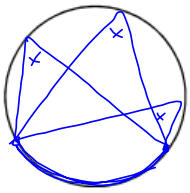
Instructions	Sketch
NOW: ○ flip the circle over and draw 3 chords of the same length on the circle ○ fold each of these chords with a perpendicular bisector to find the centre of the circle ○ measure the distance from each chord to the centre of the circle	

Properties:

- complete the following statements:
  1. "If chords are congruent (equal), then they must be equidistant from the centre of the circle"
     OR
  2. "If two chords are equidistant from the centre of a circle then they must be congruent."
  3. "The perpendicular bisector of a chord goes through the centre of a circle"
  4. "The perpendicular to a chord through the centre of a circle bisects the chord"

6.8.2: Criss-Crossing the Circle (continued)

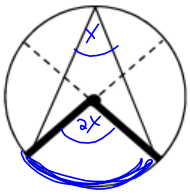
Part 2: Central Angles and Inscribed Angles

Instructions	Sketch
○ cut out the circle from the circle template given ○ fold the circle with two chords to create an inscribed angle ○ create two more chords that open on the same arc as the chords above (subtend the same arc) ○ measure the inscribed angles created (repeat the above as many times as you need to in order to see the pattern)	

Properties:

○ complete the following statement:

"The measure of inscribed angles opening onto the same arc or chord are equal" (subtended by)

Instructions	Sketch
NOW: ○ fold to make a chord on the circle and then fold to make another chord that shares one endpoint of the first chord ○ you should have an inscribed angle from these two cords; trace the angle with a pencil ○ find the centre of the circle, by folding along two diameter lines that share one endpoint of one of the chords; trace the radii with a pencil out from the centre point to the arc (a sketch has been provided to help with this construction) ○ measure the i) inscribed angle ii) central angle	

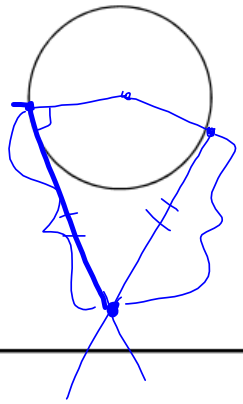
Properties:

○ complete the following statement:

"If a central angle and inscribed angle open onto the same arc length, then the ratio of the measure of the central angle to the inscribed angle is 2 : 1"

6.8.2: Criss-Crossing the Circle (continued)

Part 3: Properties of Tangents to a Circle

Instructions	Sketch
○ cut out the circle from the circle template given ○ fold the circle to create any two diameter lines; trace two radii lines from these ○ glue the circle you have been using on to a page in your notebook ○ create two tangents to the circle at the radii endpoints ○ mark the point where the two intersect ○ note the length of the segment from the point of intersection to the point where each tangent meets its radius (we will refer to these as tangent segments) ○ note the angle at which the tangents meet the radii lines	

Properties:

○ complete the following statements:

1. "The tangent segments to a circle are equal in length"
2. "The tangents meet the radii of the circle at 90 degrees"