Lesson 11-9 Segment Relationships in Circles

AGENDA:
- Check & Review Homework 11-8
- Notes and Guided Practice

HOMEWORK:
- p. 796 # 12, 13, 22, 23, 25

\[3x + 3x + 4x + 5x = 360\]
\[15x = 360\]
\[x = 24\]

\[m\angle 1 \quad 48\] 
\[m\angle 2 \quad 36\] 
\[m\angle 3 \quad 60\] 
\[m\angle 4 \quad 36\] 
\[m\angle 5 \quad 144\] 
\[m\angle 6 \quad 96\] 
\[m\angle 7 \quad 84\] 
\[m\angle 8 \quad 96\] 
\[m\angle 9 \quad 108\] 
\[m\angle 10 \quad 72\] 
\[m\angle 11 \quad 12\]
11-9 Notes: Segment Relationships in Circles: Chord-Chord Product

MEASUREMENTS
- Arc-angle relationships are measured in **DEGREES**.
- Segments and chords are measured in **LINEAR UNITS** such as inches or centimeters.
- In each problem, identify whether you are asked to find an angle measure, an arc length, or a segment length:

**ARC MEASURE**

\[ \theta \]

\[ \theta = \frac{1}{2} (\theta_1 + \theta_2) \]

**SEGMENT LENGTH**

\[ (\text{cm}) \]

**ANGLE MEASURE**

\[ \theta \]

\[ \theta = \frac{1}{2} (\theta_1 - \theta_2) \]

**SEGMENT MEASURE**

\[ (\text{cm}) \]

\[ x = \frac{1}{2} (204 - 242) \]

\[ x = \frac{1}{2} (204 - 242) \]

**TYPES OF SEGMENT RELATIONSHIPS**

1) **CHORD-CHORD PRODUCT THEOREM**

- **\( \Delta I \sim \Delta II \)**
- **SSS**
- **SAS**
- **AA**

- **VERTICAL \( \angle \)'S**
- **INSCRIBED**
- **\( \angle \)'S** FROM \( \angle \)'S IN A \( \bigcirc \)
- **SAME ARC IN A \( \bigcirc \)**
- **\( \Delta \)'S**

- **\( \Delta I \sim \Delta II \)**
- **\( \frac{a}{b} = \frac{x}{y} \)**
- **\( \sim \Delta \)'S**

- **PROPORTIONAL**
- **CORRESPONDING SIDES**

- **CROSS PRODUCTS**
- **PROPERTY**
- **\( a \cdot b = y \cdot x \)**

- **PART : PART = PART : PART**
2) TANGENT-TANGENT SEGMENT CONGRUENCY
   (Review)

\[ \Delta I \cong \Delta II \text{ by } \]
\[ \text{RADIANS} \]
\[ \text{TANGENT} \]
\[ \text{Q PT TANGENCY} \]
\[ \rightarrow \text{RT } \&'s \rightarrow \]
\[ \text{RT } \Delta 's \]
\[ AE \cong CE \text{ by CPCTC} \]

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**CHORD-CHORD PRODUCT**

If 2 chords intersect in a circle, then the products of the segments of the chords are equal.

**EXAMPLE:** Find each chord length

\[ PQ \cdot QR = SQ \cdot QT \]
\[ (6)(4) = x(8) \]
\[ 24 = 8x \]
\[ 3 = x \]

**PART \cdot PART = PART \cdot PART**

\[ PR = 6 + 4 \]
\[ PR = 10 \text{ units} \]

\[ ST = SQ + QT \]
\[ ST = 3 + 8 \]
\[ ST = 11 \text{ units} \]
PRACTICE:

1) Archaeologists discovered a fragment of an ancient disk. To calculate the original diameter, they drew a chord \( AB \) and its perpendicular bisector \( PQ \). Find the diameter of the disk.

\[ PR = 3 + x \]

\[ PQ \cdot QR = AQ \cdot QB \]

\[ (3)(x) = (5)(5) \]

\[ 3x = 25 \rightarrow x = \frac{25}{3} \]

Why couldn't you use the perpendicular bisector of a chord with a right triangle here?

\[ \text{NO CENTER GIVEN - YOU DON'T KNOW RADIUS} \]

2) In the accompanying diagram, \( AFB, AEC, \) and \( BGC \) are tangent to circle \( O \) at \( F, E, \) and \( G \), respectively. If \( AB = 32 \), \( AE = 20 \), and \( EC = 24 \), find \( BC \).

\( O \) is the incenter of \( \triangle ABC \) and \( O \) is inscribed in \( \triangle ABC \).

\[ BC = BG + GC = 12 + 24 = 36 \text{ UNITS} \]

Tangents to a circle from the same external point are equal.
3) Find the value of x in circle A.

\[ 2y = 2.4 \]
\[ y = 1.2 \]

**LOOK @ POINT OF INTERSECTION**

**DIAM \( \neq \) CHORD \( \rightarrow \) NO BISECTING

\[ p \cdot p = p \cdot p \]
\[ (2.5)(x) = (2.4+y)(y) \]
\[ 2.5x = (3.6)(1.2) \]
\[ 2.5x = 4.32 \]
\[ x = \frac{4.32}{2.5} \]
\[ x = 1.728 \text{ cm} \]

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**Segment-Segment Relationships**

**Same Internal Pt:** Chord-Chord

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<th>Example</th>
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<td><img src="" alt="Diagram" /></td>
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**Algebraic Equation**

\[ \frac{a}{x} = \frac{b}{y} \]

**Derived from**

\[ \sim \triangle S \text{ FROM } AA \sim \]

**DON'T JUMP CHORDS**