Lesson 11-2: Lines that Intersect Circles

AGENDA
- Check HW 11.1
- Lesson Notes & Guided Practice (fill in graphic org)

HOMEWORK
p 761 # 15, 25-30, 38, 39, 48
QUIZ - NEXT CLASS!

p 752-53: #11,13, 16-27
11. chords: $RS$, $VV$; secant: $VV$; tangent: $e$; diam.: $VV$; radii: $PV$, $PW$

16. $2x^2 = 8x$
   $2x^2 - 8x = 0$
   $2x(x-4) = 0$
   $x=0$ $x-4=0$
   $x=4$

26. $m\angle Q$
   $138^\circ$

13. radius of $\odot C: 2$; radius of $\odot D: 4$; pt. of tangency: $(-4, 0)$; eqn. of tangent line $x = -4$

17. $y^2 = y$
   $7$
   $y = 7$

27. $m\angle P$
   $45^\circ$

$4x + 180^\circ = 360^\circ$
18. Two circles with the same center are congruent. S
19. A tangent to a circle intersects the circle at two points. N
20. Tangent circles have the same center. N
21. A tangent to a circle will form a right angle with a radius that is drawn to the point of tangency. A
22. A chord of a circle is a diameter. S

**Graphic Design** Use the following diagram for Exercises 23–25.

The peace symbol was designed in 1958 by Gerald Holtom, a professional artist and designer. Identify the following:

23. diameter \( \overline{AC} \)
24. radii \( \overline{PA}, \overline{PB}, \overline{PC}, \overline{PD} \)
25. chord \( \overline{AC} \)

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**Arc Vocabulary**

Fill in the definitions and an example of each using \( \bigcap \) M.

- **Central Angle** – an \( \angle \) whose vertex is the \( \text{center} \) of the circle. Ex: \( \angle \text{CMD} \)
  - Note: a central angle \( \text{intercepts} \) an arc (the endpoints and all points on the circle between them) of the circle. The measure of the intercepted arc is \( \text{equal to} \) the degree measurement of its central angle.
  - Ex: \( m \angle \text{CMD} = m \angle \text{CD} \)

- **Major Arc** – the arc on the \( \text{exterior} \) of a central angle.
  - Named by \( \overset{\frown}{3} \) points.
  - Ex: \( \overset{\frown}{CAD} \)

- **Minor Arc** – the arc on the \( \text{interior} \) of a central angle.
  - Named by \( \overset{\frown}{2} \) points.
  - Ex: \( \overset{\frown}{CD} \)
• Semicircle – an arc whose endpoints are a **DIA**METER of the circle.
  - Named by 3 points.
  - **Ex:** ______
  - **Note:** a central angle that intercepts a semicircle (180°) is a **STRAIGHT** angle.

• **Ad**Jacent **Ar**cs – arcs on the same circle that share a **COMMON ENDPOINT**
  - **Ex:** ______

• **Congruent** **Ar**cs – arcs which have **SAME MEASURE**
  - **Ex:** ______
  - **Ex:** ______

**AD & BC OVERLAPPING ARC THEOREM**
Arc Addition Postulate
The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.

Example: Find the measure of each arc.
1) $m\overarc{AC} = m\overarc{AB} + m\overarc{BC}$
   $47^\circ + 110^\circ = 157^\circ$
2) $m\overarc{AD}$
   $360^\circ - m\angle ACP = 360^\circ - 204^\circ = 156^\circ$
3) $m\overarc{AD} + m\overarc{BC}$
   $156^\circ$
4) $m\overarc{DCB}$
   $157^\circ$

Fill in graphic organizer (front)

<table>
<thead>
<tr>
<th>θ and arc relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center of circle</td>
</tr>
<tr>
<td><strong>CENTRAL (EXTENDED)</strong></td>
</tr>
<tr>
<td><strong>RADII</strong></td>
</tr>
<tr>
<td>$\theta = m\overarc{ARC}$</td>
</tr>
</tbody>
</table>
Theorem 11-2-2

<table>
<thead>
<tr>
<th>THEOREM</th>
<th>HYPOTHESIS</th>
<th>CONCLUSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a circle or congruent circles:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Congruent central angles have congruent chords.</td>
<td>$\angle EAD \cong \angle BAC$</td>
<td>$DE \cong BC$</td>
</tr>
<tr>
<td>(2) Congruent chords have congruent arcs.</td>
<td>$ED \cong BC$</td>
<td>$DE \cong BC$</td>
</tr>
<tr>
<td>(3) Congruent arcs have congruent central angles.</td>
<td>$ED \cong BC$</td>
<td>$\angle DAE \cong \angle BAC$</td>
</tr>
</tbody>
</table>

In a $\bigodot$ circle or $2 \cong \bigodot$'s, $\equiv \phantom{\equiv} \leftrightarrow \equiv \phantom{\equiv}$

*Fill in graphic organizer*

<table>
<thead>
<tr>
<th>$\equiv$ central angles have $\equiv$ chords</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\equiv$ chords have $\equiv$ arcs</td>
</tr>
<tr>
<td>One $\bigodot$ or $\equiv \bigodot$'s</td>
</tr>
<tr>
<td>$\equiv$ arcs have $\equiv$ central angles</td>
</tr>
</tbody>
</table>

Example: Given $\bigodot F$, find the following:

a) $m\overline{CD} + m\overline{DE} = 90^\circ + 18^\circ = 108^\circ$

b) $m\overline{BC} = 72^\circ$

c) $m\overline{CAE} + 18^\circ + 172^\circ = 262^\circ$

da) $m\angle AFE = 172^\circ$ \(\vdash m\angle ARC\)
Practice:

1. $RS \cong TU$. Find the measure of $\widehat{RS}$.

   \[3x = 2x + 27\]
   \[x = 27\]
   \[\angle 27 = 81 = \angle RS\]

2. $\odot B \equiv \odot C \equiv \odot D$. Find the measure of $\angle DEF$.

   \[\angle DEF \equiv \angle ABC\]
   \[7y - 43 = 5y + 5\]
3) \( \overline{PT} \) bisects \( \angle RPS \) in \( \odot P \). Find \( RT \).

\[ RT = ST \]

\[ 6x = 20 - 4x \]

4) \( \odot A \cong \odot B \). \( \overline{CD} \parallel \overline{EF} \). Find \( m\angle CD \).

\[ CD \parallel EP \]

\[ 25y = 30y - 20 \]
Parallel Chords

Theorem: In a circle, parallel chords intercept congruent arcs.

*Fill in graphic organizer

**Arrows and Chords**

- Parallel chords intercept congruent arcs

**Example:** Given trapezoid $ABCD$ inscribed in circle $O$, 1) explain why the trapezoid is an isosceles trapezoid and 2) find the measure of $\overline{AC}$.

$\overparen{AD} \cong \overparen{BC}$

$
\angle \text{arc } \overparen{AC} = 80^\circ + 50^\circ = 130^\circ
$

$\parallel \text{ chords in } \angle AOC$

$\Rightarrow \quad \text{arcs } \overparen{AD} \cong \overparen{BC}$

$
\text{arc } \overparen{AD} \cong \text{arc } \overparen{BC}
$

$
\angle \text{s have } \angle \text{ chords in } \angle AOC
$

$x = 7x - 20$

$20 = 2x$

$10 = x$
Attachments

Bridge to Unit 11 KEY.docx