Name
Adv Geo

Ms. Kresovic
W 10 Apr 2013

10-2: Congruent Chords

Objective

After studying this section, you will be able to

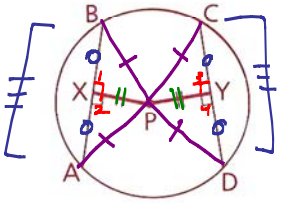
- Apply the relationship between congruent chords of a circle

Theorem 77 ***If two chords of a circle are equidistant from the center, then they are congruent.***

chds eqdist $\Rightarrow \cong$ chds

Given: $\odot P$, $\overline{PX} \perp \overline{AB}$, $\overline{PY} \perp \overline{CD}$, $\overline{PX} \cong \overline{PY}$

Prove: $\overline{AB} \cong \overline{CD}$



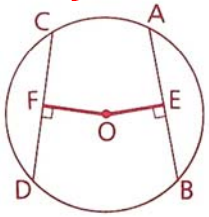
1. $PX \perp AB, PY \perp CD$	1. given
2. $\angle 1, \angle 2, \angle 3, \angle 4$ rt $\angle$s	2. $\perp \Rightarrow$ rt $\angle$
3. $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$	3. rt $\angle$s $\Rightarrow \cong \angle$s
4. Draw $\overline{PA}, \overline{PB}, \overline{PC}$, & $\overline{PD}$	4. Aux
5. $\overline{PA} \cong \overline{PB} \cong \overline{PC} \cong \overline{PD}$	5. $\odot \Rightarrow \cong$ rad
6. $\overline{PX} \cong \overline{PY}$	6. Given
7. $\triangle PAX \cong \triangle PBX \cong \triangle PCY \cong \triangle PDY$	7. HL
8. $\overline{AX} \cong \overline{XB} \cong \overline{CY} \cong \overline{YD}$	8. CPCTC
9. $\overline{AB} \cong \overline{CD}$	9. Add

Theorem 78 ***If two chords of a circle are congruent, then they are equidistant from the center of the circle.***

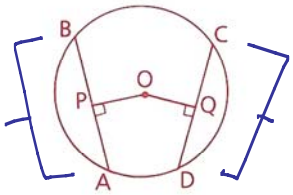
$\cong$ chds $\Rightarrow$ chs eqdist

Given: $\odot O$, $\overline{AB} \cong \overline{CD}$, $\overline{OE} \perp \overline{AB}$, $\overline{OF} \perp \overline{CD}$

Prove: $\overline{OE} \cong \overline{OF}$



Problem 1 Given: $\odot O$, $\overline{AB} \cong \overline{CD}$,
$OP = 12x - 5$, $OQ = 4x + 19$
Find: OP



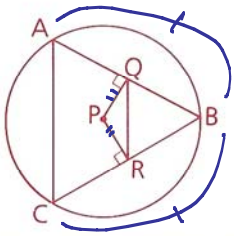
Solution AB = CD (given), OP = OQ ($\cong$ chds $\Rightarrow$ chds eq dist)

$12x - 5 = 4x + 19$
$-4x \quad +5 \quad -4x \quad +5$

$8x = 24$
$x = 3$

$OP = 12(3) - 5 = 31$

Problem 2 Given: $\triangle ABC$ *is isosceles, with base* $\overline{AC}$.
$\odot P$, $\overline{PQ} \perp \overline{AB}$, $\overline{PR} \perp \overline{CB}$
Prove: $\triangle PQR$ *is isosceles.*



Proof

1 $\odot P$, $\overline{PQ} \perp \overline{AB}$, $\overline{PR} \perp \overline{CB}$	1 Given
2 $\triangle ABC$ is isosceles, with base $\overline{AC}$.	2 Given
3 $\overline{AB} \cong \overline{BC}$	3 ISOS $\Rightarrow$ 2 $\cong$ sds
4 $\overline{PQ} \cong \overline{PR}$	4 $\cong$ chds $\Rightarrow$ chds eq dist
5 $\triangle PQR$ is isosceles.	5 2 sds $\cong$ $\Rightarrow$ ISOS

AMDG

NAME
Adv Geo
10-2: 1-12, skip 8 & 10

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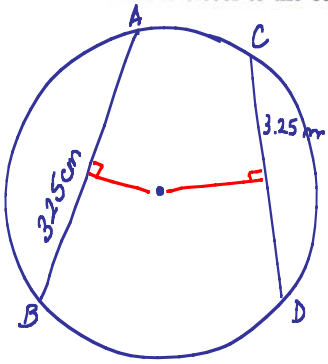
1 In a circle, chord $\overline{AB}$ is 325 cm long and chord $\overline{CD}$ is $3\frac{1}{4}$ m long. Which is closer to the center?

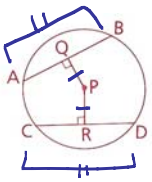


3.25 m = 325 cm

$\cong$ chds $\Rightarrow$ chds eq dist

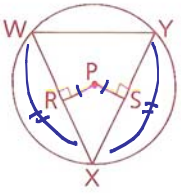
2 Given: $\odot P$, $\overline{PQ} \cong \overline{PR}$, $AB = 6x + 14$, $CD = 4 - 4x$

Find: AB

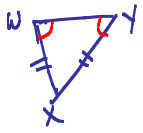


3 Given: $\odot P$, $\overline{PR} \perp \overline{WX}$, $\overline{PS} \perp \overline{XY}$, $\overline{PR} \cong \overline{PS}$

Conclusion: $\angle W \cong \angle Y$

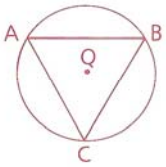


1. $\odot P$, $\overline{PR} \perp \overline{WX}$, $\overline{PS} \perp \overline{XY}$, $\overline{PR} \cong \overline{PS}$ — 1. given
2. $\overline{WX} \cong \overline{YX}$ — 2. chds eq dist $\rightarrow \cong$ chds
3. $\angle XWY \cong \angle XYW$ — 3. $\triangle$s $\Rightarrow \triangle$



4 Given: Equilateral $\triangle ABC$ is inscribed in $\odot Q$.

Conclusion: $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$ are equidistant from the center.



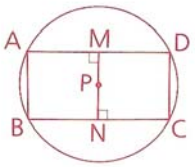
In quad if 1 pr opp sds both $\cong$ & $\parallel$, then $\square$

5 Given: $\odot P$;

P is the midpoint of $\overline{MN}$.

$\overline{MN} \perp \overline{AD}$, $\overline{MN} \perp \overline{BC}$

Conclusion: ABCD is a $\square$.

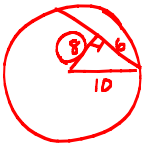


6 A fly is sitting at the midpoint of a wooden chord of a circular wheel. The wheel has a radius of 10 cm, and the chord has a length of 12 cm.

a How far from the hub (center) is the fly?

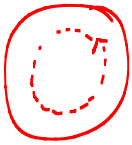
b The wheel is spun. What is the path of the fly?

a



$2(3\,45)$ **8cm**

b.

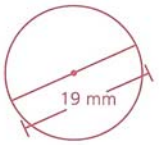


$\rightarrow$ circle

7 ~~To the nearest hundredth~~, find

a The area of the circle

b The circumference of the circle



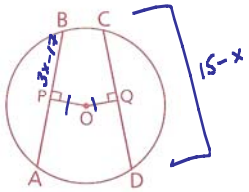
a) $A = \pi r^2 = \left(\frac{19}{2}\right)^2 \pi = \frac{361}{4}\pi$

b) $C = d\pi = 19\pi$

11 In circle O, PB = 3x − 17, CD = 15 − x, and OQ = OP = 3.

a Find AB. = 8

b Find the radius of ⊙O.



$PO = OQ \Rightarrow BA = CD$

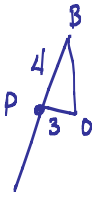
$2(3x-17) = 15-x$

$6x - 34 = 15 - x$

$+x \quad +34 \quad +34+x$

$7x = 49$

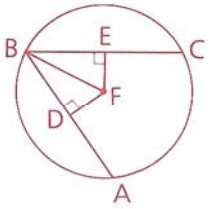
$x = 7$



a. $15 - 7 = 8$

b. 5

9 Given: ⊙F,
$\overline{FE} \perp \overline{BC}$, $\overline{FD} \perp \overline{AB}$;
$\overrightarrow{BF}$ bisects ∠ABC.
Prove: $\overline{BC} \cong \overline{BA}$



12 A regular hexagon with a perimeter of 24 is inscribed in a circle. How far from the center is each side?

$2\sqrt{3}$