Name
Adv Geo

Ms. Kresovic
W 10 Apr 2013

10-2: Congruent Chords

Objective

After studying this section, you will be able to

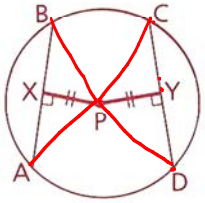
- Apply the relationship between congruent chords of a circle

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

chds eqdist ⇒ ≅ chds

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

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



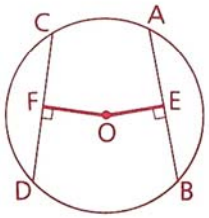
$\triangle$s ≅ by HL

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

≅ chds ⇒ chds eqdist.

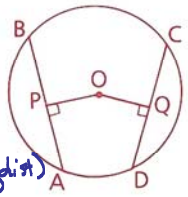
Given: $\odot O$, $\overline{AB} \cong \overline{CD}$, $\overline{OE} \perp \overline{AB}$, $\overline{OF} \perp \overline{CD}$

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 ↓ not proof

$\odot O$, $AB = CD$ (g) $\rightarrow OP = OQ$ ($\cong$ chds $\rightarrow$ chds eq dist)

$12x - 5 = 4x + 19$

$-4x + 5 \quad -4x + 5$

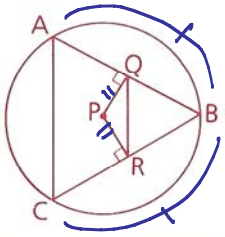
$8x = 24$

$x = 3$

$OP = 12(3) - 5 = \boxed{31}$

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 sds $\cong$
4 $\overline{PQ} \cong \overline{PR}$	4 $\cong$ chds $\Rightarrow$ chds eq dist
5 $\triangle PQR$ is isosceles.	5 2 sds $\cong$ ISOS

AMDG

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10-2: 1-12, skip 8 & 10

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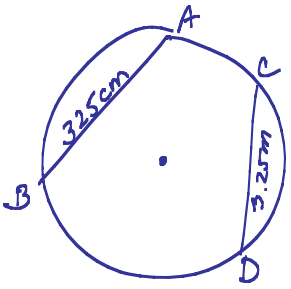
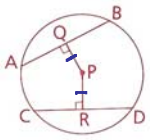
1 In a circle, chord $\overline{AB}$ is 325 cm long and chord $\overline{CD}$ is $3\frac{1}{4}$ m long. Which is closer to the center?



3.25m

2 ≅ chds ⇒ chds equidist from ctr.

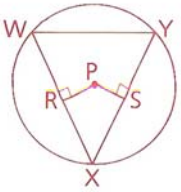
2 Given: $\odot P$, $\overline{PQ} \cong \overline{PR}$,
$AB = 6x + 14$,
$CD = 4 - 4x$
Find: AB



PQ=PR → AB=CD
(equids → ≅chds)

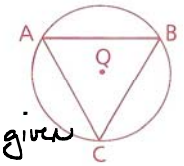
$6x+14 = 4-4x$
$+4x \quad -14 \quad -14 \quad +4x$
$10x = -10$
$x = -1$
$AB = 6(-1)+14 = 8$
or $4-4(-1) = 4+4 = 8$

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



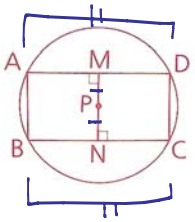
1. $\odot P$, $\overline{PR} \perp \overline{WX}$, $\overline{PS} \perp \overline{XY}$	1. given
2. $\overline{WX} \cong \overline{YX}$	2. eqdist ⇒ ≅chds
3. $\triangle WXY$ isos, base WY	3. 2 ≅ sds ⇒ isos
4. $\angle W \cong \angle Y$	4. △ ⇒ △

4 Given: Equilateral △ ABC is inscribed in $\odot Q$.
Conclusion: $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$ are equidistant from the center.



1. Eq △ ABC inscribed in $\odot Q$	1. given
2. $\overline{AB} \cong \overline{BC} \cong \overline{CA}$	2. Eq △ ⇒ ≅ sds
3. $\overline{AB}$, $\overline{BC}$, & $\overline{CA}$ eqdist from ctr	3. ≅chds ⇒ eqdist chds

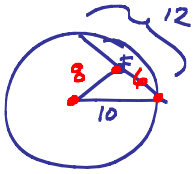
5 Given: $\odot P$;
P is the midpoint of $\overline{MN}$.
$\overline{MN} \perp \overline{AD}$, $\overline{MN} \perp \overline{BC}$
Conclusion: ABCD is a ▱.

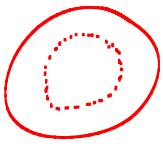


1. $\odot P$, P mdpt $\overline{MN}$	1. given
2. $\overline{PM} \cong \overline{NP}$	2. mdpt ⇒ ≅ segs
3. $\overline{AD} \cong \overline{BC}$	3. eqdist ⇒ ≅ chds
4. $\overline{MN} \perp \overline{AD}$ & $\overline{BC}$	4. given
5. $\overline{AD} \parallel \overline{BC}$	5. lines ⊥ to same line ⇒ ∥
6. □ ABCD	6. In quad, if 1 pr opp sds is both ≅ & ∥, then □

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

Circle

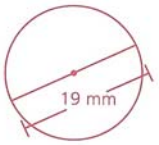




7 ~~To the nearest hundredth~~, find

a The area of the circle

b The circumference of the circle



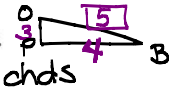
a. $A = r^2\pi = \left(\frac{19}{2}\right)^2\pi =$

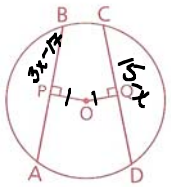
b. $C = d\pi = 19\pi$

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

a Find AB. = 8

b Find the radius of ⊙O.





a] eq dist chds ⇒ ≅ chds

AB = CD

2(PB) = CD

2(3x−17) = 15−x

6x − 34 = 15 − x

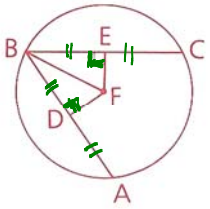
+x +34 +34 +x

7x = 49

x = 7

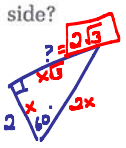
If x = 7, CD = AB = 15 − 7 = 8

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

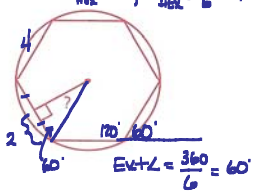


1. $\odot F$, $\overline{FE} \perp \overline{BC}$ & $\overline{FD} \perp \overline{AB}$	1. Given
2. ∠BEF & ∠BDF rt∠s	2. ⊥ ⇒ rt∠s
3. ∠BEF ≅ ∠BDF	3. rt∠s ⇒ ≅ ∠s
4. $\overrightarrow{BF}$ bis ∠ABC	4. Given
5. ∠DBF ≅ ∠EBF	5. bis ⇒ ≅ ∠s
6. $\overline{BF} \cong \overline{BF}$	6. Ref
7. △DBF ≅ △EBF	7. AAS
8. $\overline{BD} \cong \overline{BE}$	8. CPCTC
9. $\overline{BC} \cong \overline{BA}$	9. Chds = dist ⇒ ≅ chds

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



$P_{HEX} = 24$, $S_{HEX} = \frac{24}{6} = 4$



Ext∠ = $\frac{360}{6} = 60$