10.1. Honors Geometry

DATE: 4/19

Target 9A. Know and apply the properties of tangents, secants, chords, and arcs

Write down the notes in your own words based on the class Nspire presentation.

The Basics

⊙ "symbol"

1) What is the definition of a *circle*?

A set of all pts in a plane equidistant from a pt. called center.

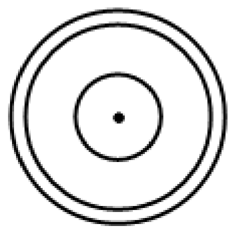
2) What is the *radius* of a circle?

A segment joining the center pt. to a pt. on the circle. (Radii – plural)

Recall: All radii are ≅

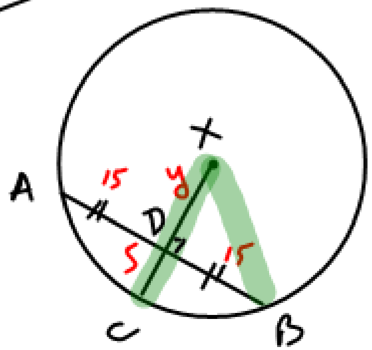
Concentric Circles

Two or more coplanar circles sharing the same center.



The Interior and Exterior of a Circle

Ex 1:



Given: $\odot X$

$AB = 30$

$CD = 5$

Find: The radius of $\odot X$.

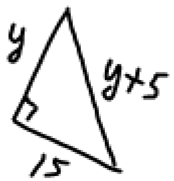
$\overline{XD} \perp \overline{AB}$ by definition.

$\overline{AD} \cong \overline{DB}$ by Thm 1 in notes.

$\therefore AD = DB = 15$

$\overline{CX} \cong \overline{XB}$ all radii $\cong$.

$\therefore CX = y + 5 = XB$



$a^2 + b^2 = c^2$

$y^2 + 15^2 = (y+5)^2$

$y^2 + 225 = (y+5)(y+5)$

$y^2 + 225 = y^2 + 10y + 25$

$-y^2 \qquad -y^2$

$225 = 10y + 25$

$-25 \qquad -25$

$\frac{200}{10} = \frac{10y}{10}$

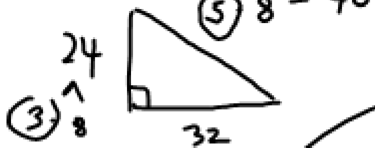
$20 = y$

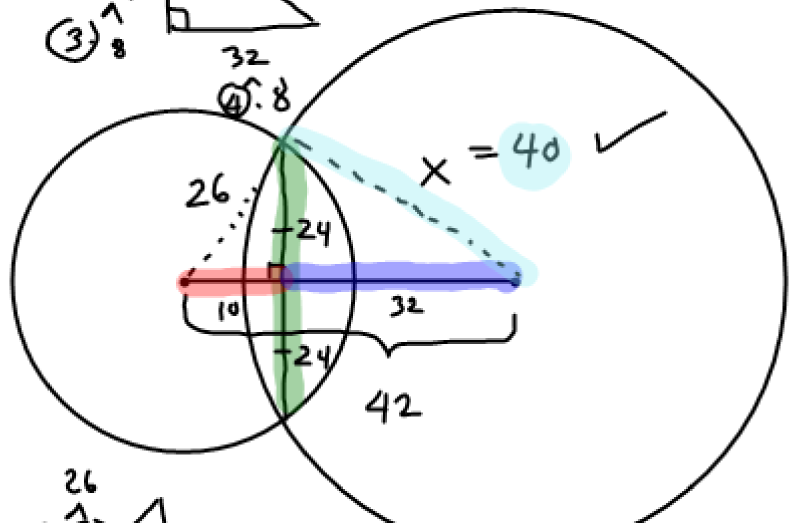
$\therefore$ Radius $= 20 + 5$

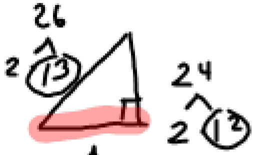
$= 25$ ⊠

Ex 2:

Two $\odot$s intersect and share a common chord whose length is 48cm. The centers of 2 $\odot$s are 42cm apart. The radius of 1 $\odot$ is 26cm. Find radius of other $\odot$.







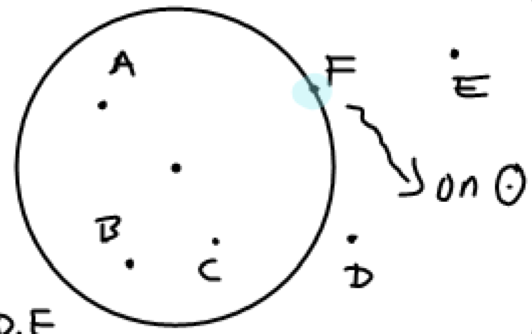
$2 \cdot 5 = 10$

$42 - 10 = 32$

10.1 Radius Chord Relationships [Compatibility Mode] - Microsoft Word

The Interior and Exterior of a Circle

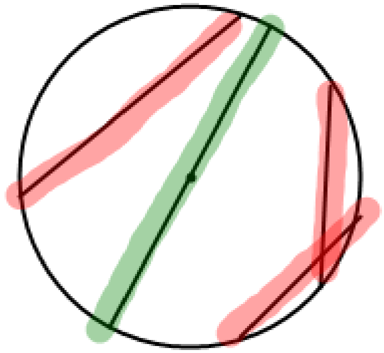
- A pt. is in the interior of a ⊙ if its distance is LESS than radius. } A, B, C
- A pt. is in the exterior of a ⊙ if its distance is GREATER than radius } D, E



Chords and Diameters of a Circle

Chord: Segment joining ANY two pts. on a circle.

Diameter: A chord that passes through the center of circle.



Every chord is NOT a diameter, but every diameter is a chord!

10.1 Radius Chord Relationships [Compatibility Mode] - Microsoft Word

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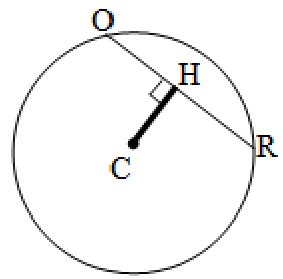
Definition: The distance from the center of a circle to a chord is the measure of the perpendicular (⊥) segment from the center to the chord.

Fill in the blanks below.

CH is the distance from C to chord $\overline{OR}$.



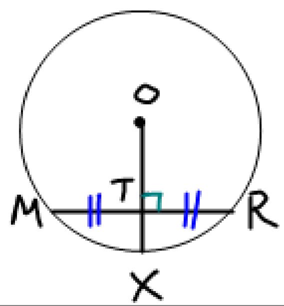
Radius-Chord Relationships

If a radius is perpendicular to a chord, then it bisects the chord.

Given: ⊙O
$\overline{OX} \perp \overline{MR}$

Diagram:

Prove: $\overline{MT} \cong \overline{RT}$



Proof: Sketch is $\triangle MTO \cong \triangle RTO$ by HL. $\overline{MT} \cong \overline{RT}$ by CPCTC.

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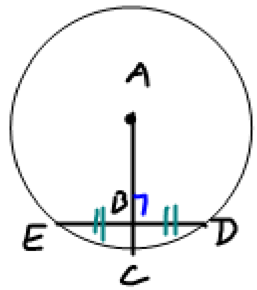
10.1 Radius Chord Relationships [Compatibility Mode] - Microsoft Word

If a radius of a circle bisects a chord that is not diameter, then it is ___$\perp$___ to that chord.

Given: $\odot A$

$\overline{AC}$ bis $\overline{ED}$

Diagram:



Prove: $\overline{AC} \perp \overline{ED}$

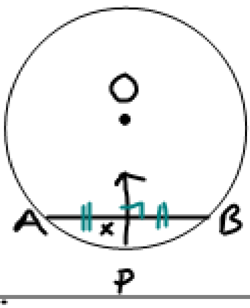
Proof: $\overline{ED} \cong \overline{DB}$ def bis, $\overline{EA} \cong \overline{DA}$ all radii $\cong$

$\overleftrightarrow{AC}$ $\perp$ bis of $\overline{ED}$ by Equidistance.

The perpendicular bisector of a chord passes through the ___center___ of the circle.

Given: $\overleftrightarrow{PX}$ $\perp$ bis $\overline{AB}$

Diagram:



Prove: $\overleftrightarrow{PX}$ passes through O

Proof: Pt. O is on $\overleftrightarrow{PX}$ since the $\perp$ bis of $\overleftrightarrow{PX}$ is the set of all pts equidistant from A and B.

Since $\overline{AO} \cong \overline{OB}$, b/c all radii $\cong$, O is equidistant from A and B.

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