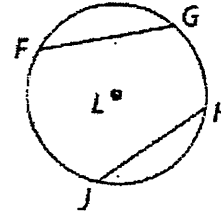


OBJECTIVE: To use arc and chord relationships to solve problems.

Theorem 10.2 Congruent arcs have congruent chords

Words In the same circle or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.

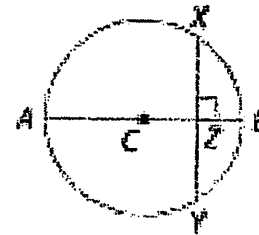
Example $\widehat{FG} \cong \widehat{HJ}$ if and only if $\overline{FG} \cong \overline{HJ}$.



Theorems Diameter perpendicular to chord bisects chord and arc

10.3 If a diameter (or radius) of a circle is perpendicular to a chord, then it bisects the chord and its arc.

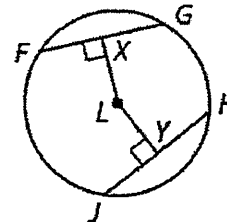
Example If diameter \overline{AB} is perpendicular to chord \overline{XY} , then $\overline{XZ} \cong \overline{ZY}$ and $\widehat{XB} \cong \widehat{BY}$.



Theorem 10.5 Congruent chords are equidistant from the center

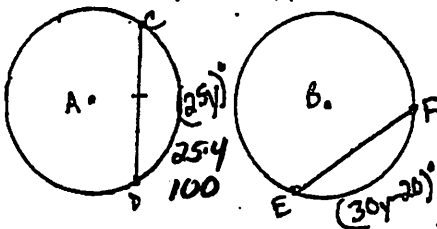
Words In the same circle or in congruent circles, two chords are congruent if and only if they are equidistant from the center.

Example $\overline{FG} \cong \overline{JH}$ if and only if $LX = LY$.



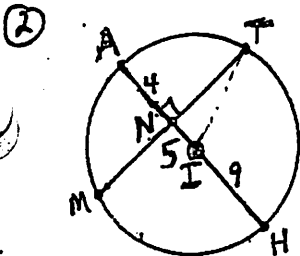
Solve the indicated measures using theorems.

① $OA \cong OB$, $\widehat{CD} \cong \widehat{EF}$



$m\widehat{CD} = 100$
 $m\widehat{EF} = 100$
 $m\angle CAD = 100$
 $CD = CB$

Chords are \cong so arcs are \cong
 $30y - 20 = 100$
 $-20y = -51$
 $y = 51$

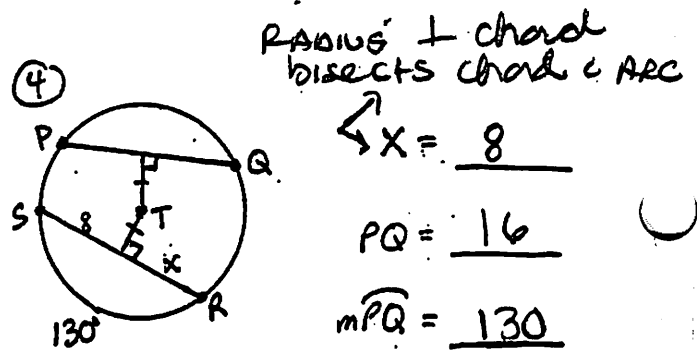
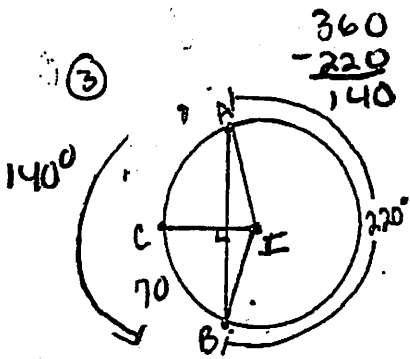


$NT = 2\sqrt{14}$

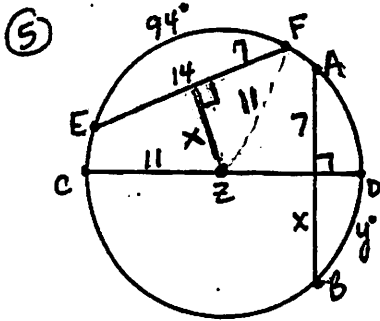
$MT = 4\sqrt{14}$

Diameter \perp
 Chord bisects
 chord & arc

Draw radii TI
 To get $\triangle TNI$ so to find NT
 Take $5^2 + x^2 = 9^2$
 $25 + x^2 = 81$
 $x^2 = 56$
 $x = 2\sqrt{14}$



\cong chords are equidistant
From the center



$x = 7$

$m\widehat{AB} = 94^\circ$

$m\widehat{BD} = 47^\circ$

distance from Z to EF = $6\sqrt{2}$
CALL THIS
x

RADIUS or DIAMETER \perp to chord
bisects the chord & ARC
chords EF & AB are \cong
since $x = 7$

RADIUS = 11

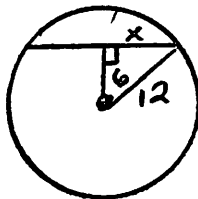
$x^2 + 7^2 = 11^2$

$x^2 + 49 = 121$

$x^2 = 72$

$x = 6\sqrt{2}$

6. Find the length of a chord that is a distance of 6cm from the center of a circle with radius 12cm.



$x^2 + 6^2 = 12^2$

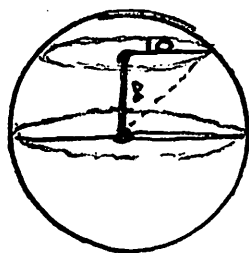
$x^2 + 36 = 144$

$x^2 = 108$

$x = 6\sqrt{3}$

CHORD \cong
 $2 \cdot 6\sqrt{3}$
 $= 12\sqrt{3}$

7. A plane 8 cm from the center of a sphere intersects the sphere in a circle whose diameter is 20cm. Find the diameter of the sphere.



DOTTED line is RADIUS of sphere

$10^2 + 8^2 = x^2$

$100 + 64 = x^2$

$164 = x^2$

$2\sqrt{41} = x$

SO DIAMETER = $2 \cdot 2\sqrt{41}$
 $= 4\sqrt{41}$