

**Geometry**  
**Arcs and Chords**

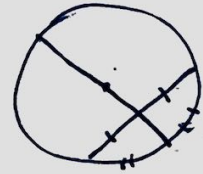
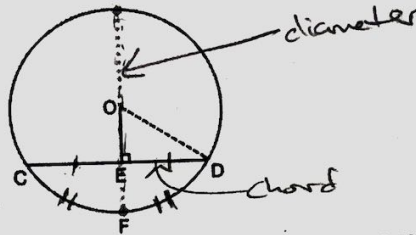
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In a circle, if a diameter is perpendicular to a chord, then it bisects the chord and its arc.

$$\widehat{mCF} \cong \widehat{mFD}$$

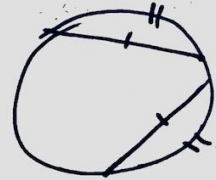
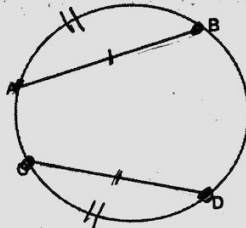
and

$$\overline{CE} \cong \overline{ED}$$



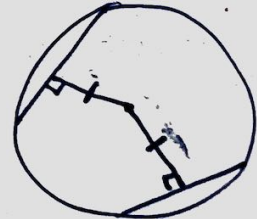
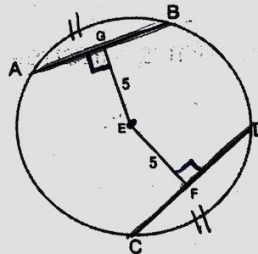
In a circle or in congruent circles, 2 MINOR ARCS are congruent if and only if their corresponding chords are congruent.

Given  $\overline{AB} \cong \overline{CD}$   
then  $\widehat{AB} \cong \widehat{CD}$



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

Since  $EG = EF$ ,  
then  $\overline{AB} \cong \overline{CD}$   
and  $\widehat{AB} \cong \widehat{CD}$



**Examples**

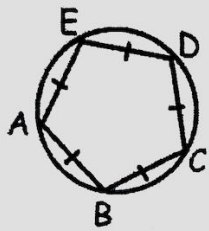
1.  $360 - 120 = 240$   
 $\frac{240}{3} = 80$   
 $\widehat{NP} = \underline{80^\circ}$

2.  $KM = \underline{24}$

3.  $12^2 + X^2 = 20^2$   
 $144 + X^2 = 400$   
 $\sqrt{X^2} = \sqrt{256} \quad X = 16$   
 $XY = \underline{32}$

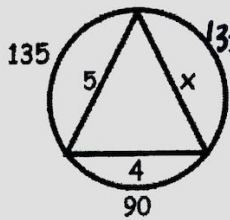
4.  $62.5^\circ$   $62.5^\circ$   $360 - 110 = 250$   
 $\frac{250}{4} = 62.5$   
 $m\widehat{BC} = \underline{62.5^\circ}$

5.  $m\angle C = \underline{72^\circ}$



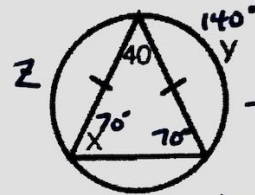
$$\frac{360^\circ}{5} = 72^\circ$$

6.  $x = \underline{5}$



$$\begin{array}{r} 360 \\ - 135 \\ \hline 225 \\ - 90 \\ \hline 135 \end{array}$$

7.  $x = \underline{70^\circ}$ ,  $y = \underline{140^\circ}$   
 $z = \underline{140^\circ}$



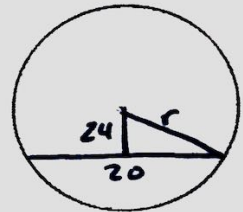
$$\begin{array}{r} 180 \\ - 40 \\ \hline 140 \end{array}$$

$$\frac{140}{2} = 70^\circ$$

8. Suppose a chord is 20 inches long and is 24 inches from the center of the circle. Find the length of the radius.

$$\begin{aligned} 24^2 + 10^2 &= r^2 \\ 576 + 100 &= r^2 \\ \sqrt{676} &= \sqrt{r^2} \end{aligned}$$

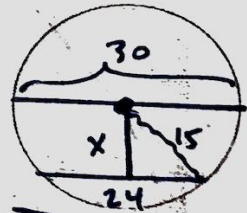
$$\boxed{r = 26 \text{ inches}}$$



9. Suppose the diameter of a circle is 30 centimeters long and a chord is 24 centimeters long. Find the distance between the chord and the center of the circle.

$$\begin{aligned} x^2 + 12^2 &= 15^2 \\ x^2 + 144 &= 225 \\ x^2 &= 81 \end{aligned}$$

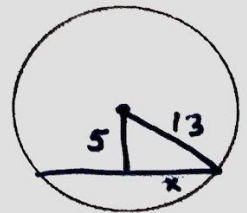
$$\boxed{x = 9 \text{ cm}}$$



10. Find the length of a chord that is 5 inches from the center of a circle with a radius of 13 inches.

$$\begin{aligned} 5^2 + x^2 &= 13^2 \\ 25 + x^2 &= 169 \\ x^2 &= 144 \\ x &= 12 \end{aligned}$$

$$2 \cdot 12 = \boxed{24 \text{ inches}}$$



11. Suppose a radius of a circle is 17 units and a chord is 30 units long. Find the distance from the center of the circle to the chord.

$$\begin{aligned} x^2 + 15^2 &= 17^2 \\ x^2 + 225 &= 289 \\ x^2 &= 64 \end{aligned}$$

$$\boxed{x = 8 \text{ units}}$$

