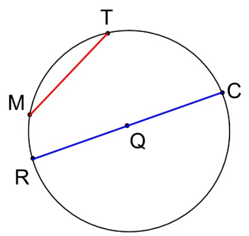
Wednesday, April 29, 2020

Sec 12-2: Chords and Arcs

Diameter:
Segment connecting two points
on the circle that passes through the center.

Chord:
Segment connecting any two points on the circle.

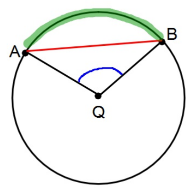


In ⊙Q:

$\overline{RC}$ is a diameter.
(a chord that contains the center)

$\overline{MT}$ is a chord.

In ⊙Q:



Central $\angle AQB$, arc $\overset{\frown}{AB}$, and chord $\overline{AB}$
are all related to each other.

We already know that the measure of an arc is equal to the measure of its central angle.

Therefore, congruent central angles have congruent arcs.

Theorem 12-4

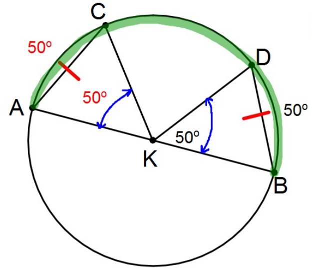
Within a circle or in congruent circles

(1) Congruent central angles have congruent chords.

(2) Congruent chords have congruent arcs.

(3) Congruent arcs have congruent central angles.

In ⊙K, $\overline{AB}$ is a diameter and $\overline{AC} \cong \overline{BD}$



Find $m\overset{\frown}{CD}$.

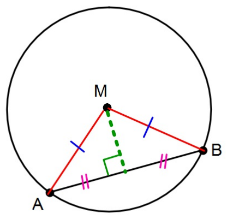
Since $\overline{AB}$ is a diameter, $\overset{\frown}{ACB} = 180°$

Since $\overline{AC} \cong \overline{BD}$, $\angle DKB \cong \angle CKA = 50°$

and $\overset{\frown}{AC} \cong \overset{\frown}{BD} = 50°$

$m\overset{\frown}{CD} = 180 - 50 - 50 = \boxed{80°}$

In ⊙M chord $\overline{AB}$ is drawn



When you draw radii $\overline{MA}$ and $\overline{MB}$ you create an Isosceles Δ.

When you draw the altitude from M of ΔAMB you bisect $\overline{AB}$.

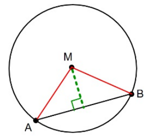
Theorem 12-5

Within a circle or in congruent circles

(1) Chords equidistant from the center are congruent.

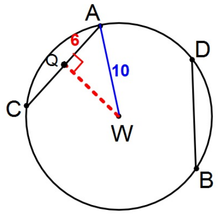
(2) Congruent chords are equidistant from the center.

Remember, the distance from a point to a line is the perpendicular distance.



When we drew the altitude in ΔAMB on the previous page it also represented the distance from the center M to chord $\overline{AB}$.

In ⊙W $\overline{AC} \cong \overline{BD}$, AC=12 and the radius is 10.



How far is $\overline{DB}$ from the center?

Since $\overline{AC} \cong \overline{BD}$ they are the same distance from the center.

When you draw the $\overline{WQ}$, the distance from the center to $\overline{AC}$, you bisect $\overline{AC}$ and create a rt ∠.

When you draw radius $\overline{WA}$ you create a rt Δ with hypotenuse=10 and a leg=6. Use Pythagorean Thm to find the other leg, $\overline{WQ}$.

$10^2 = 6^2 + WQ^2 \longrightarrow WQ^2 = 10^2 - 6^2 \longrightarrow WQ = \sqrt{10^2 - 6^2} = 8$

Both chords $\overline{AC}$ & $\overline{DB}$ are 8 units from the center (WQ).

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Theorem 12-6

In a circle, a diameter that is perpendicular to a chord bisects the chord and its arcs.

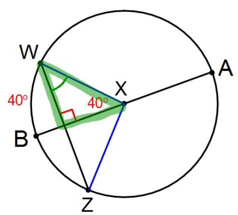
Theorem 12-7

In a circle, a diameter that bisects a chord (that is not a diameter) is perpendicular to the chord.

Theorem 12-8

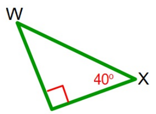
In a circle, the perpendicular bisector of a chord contains the center of the circle.

In ⊙X $\overline{AB}$ is a diameter and is perpendicular to chord $\overline{WZ}$. If m$\overset{\frown}{WZ}$=80°, find the m∠XWZ.



If $\overset{\frown}{WZ}$=80°, then $\overset{\frown}{WB}$=40°

If $\overset{\frown}{WB}$=40°, then ∠WXB=40°



∠XWZ = 180 - 90 - 40 = **50°**

You can now do the first few problems of Practice #22.

This practice will be due by 10:00 pm on Saturday, May 2.