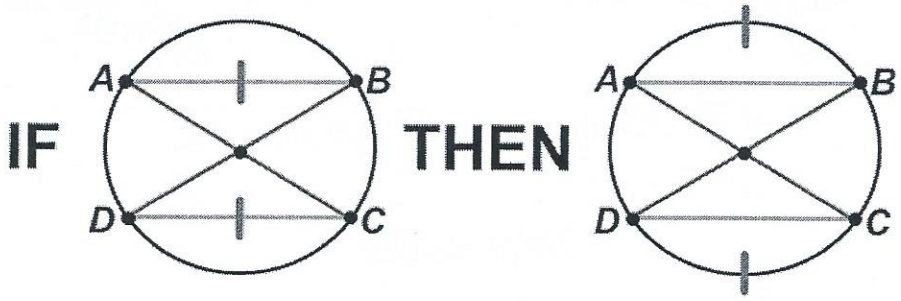
Section 10.2B
Chords

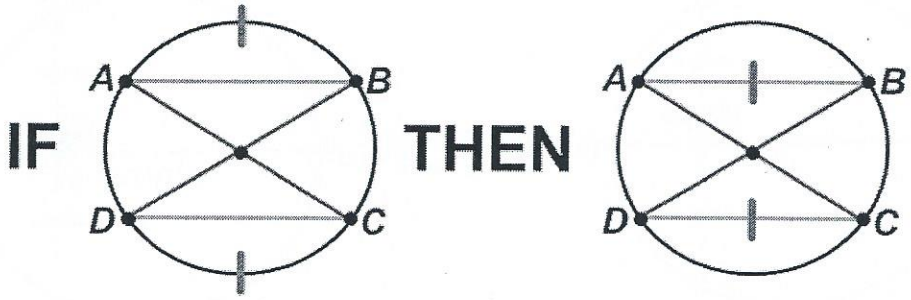
Theorem 10.4

In the same circle, or in congruent circles:

- If two chords are congruent, then their corresponding minor arcs are congruent.
- If two minor arcs are congruent, then their corresponding chords are congruent.



If $\overline{AB} \cong \overline{DC}$, then $\overset{\frown}{AB} \cong \overset{\frown}{DC}$.

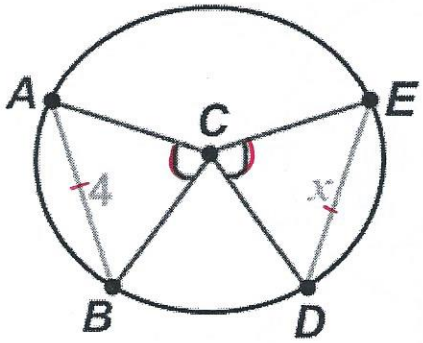


If $\overset{\frown}{AB} \cong \overset{\frown}{DC}$, then $\overline{AB} \cong \overline{DC}$.

Examples

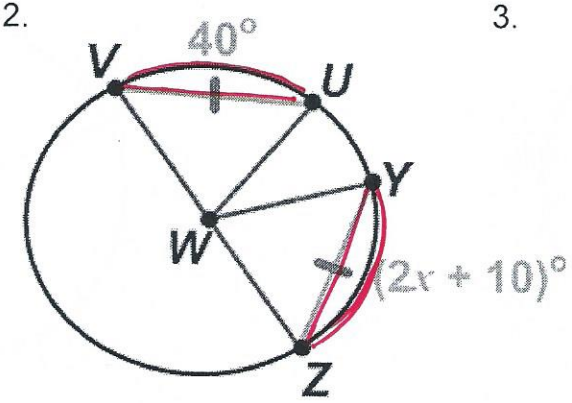
Find the value of x.

1.



$x=4$

2.

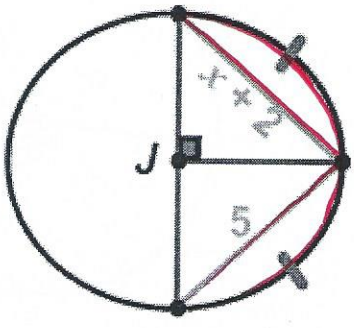


$40 = 2x+10$

$30 = 2x$

$15 = x$

3.

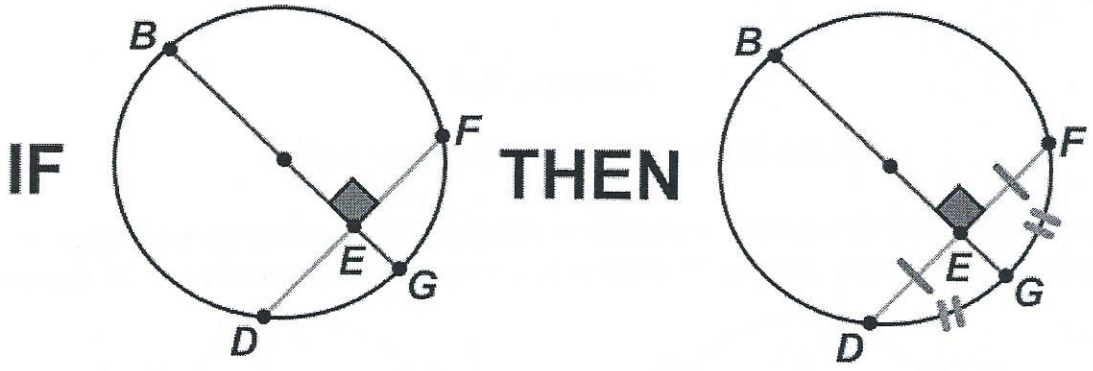


$x+2=5$

$x=3$

Theorem 10.5

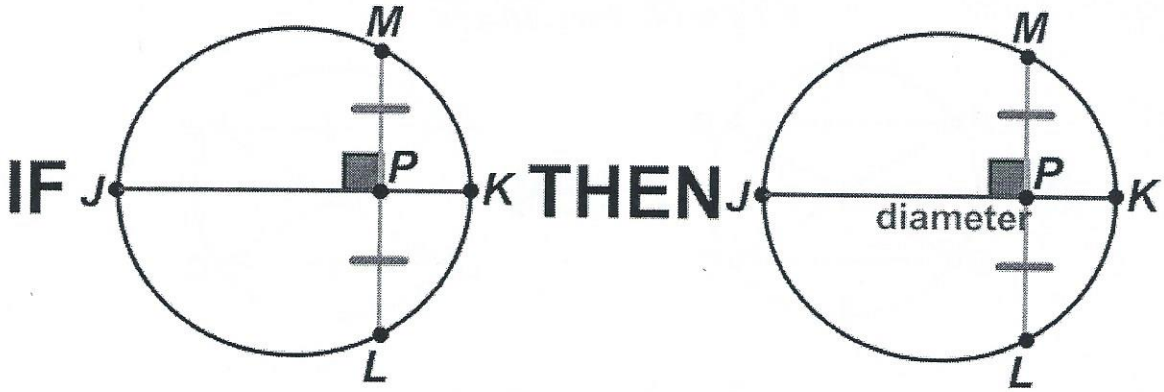
If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.



If $\overline{BG} \perp \overline{FD}$, then $\overline{DE} \cong \overline{EF}$ and $\widehat{DG} \cong \widehat{FG}$.

Theorem 10.6

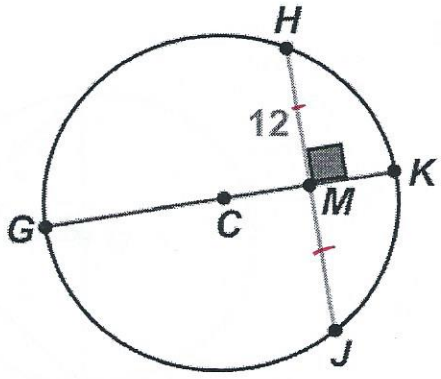
If one chord is a perpendicular bisector of another chord, then the first chord is a diameter.



If $\overline{JK} \perp \overline{ML}$ and $\overline{MP} \cong \overline{PL}$, then $\overline{JK}$ is a diameter.

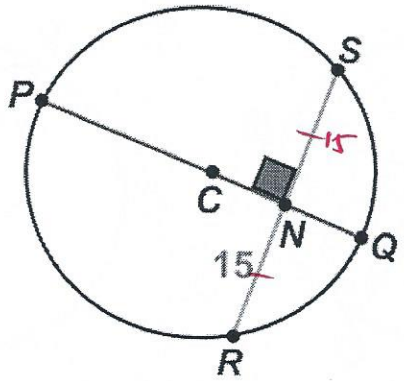
Examples

4. Find the length of $\overline{JM}$.



$JM = 12$

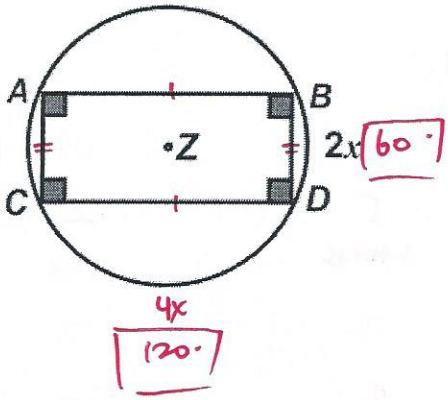
5. Find the length of $\overline{SR}$.



$SR = 30$

Determine the measure of each arc of the circle circumscribed about the polygon.

6.

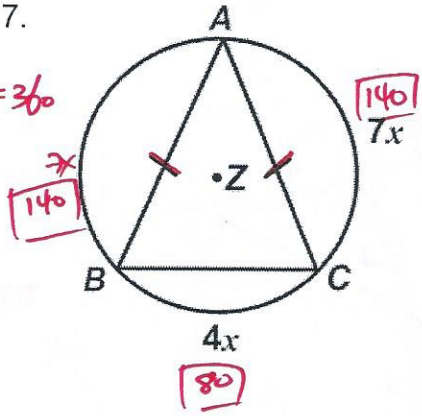


$4x + 2x + 4x + 2x = 360$

$12x = 360$

$x = 30$

7.



$7x + 7x + 4x = 360$

$18x = 360$

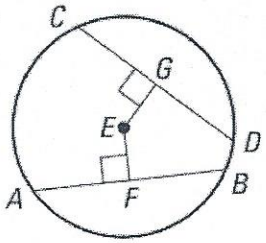
$x = 20$

THEOREM

THEOREM 10.7

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

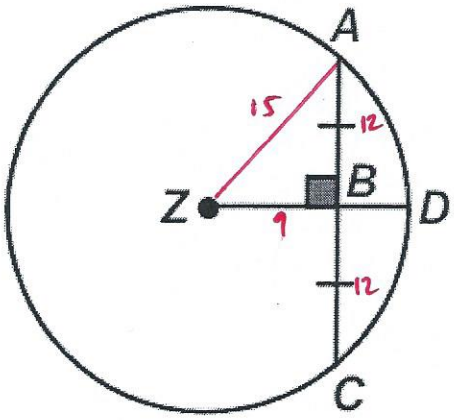
$\overline{AB} \cong \overline{CD}$ if and only if $\overline{EF} \cong \overline{EG}$.



Using the Pythagorean Theorem in Arcs and Chords

Examples

8. If $AC = 24$ and the radius = 15, find the following.



(a) AB — 12

(b) BC — 12

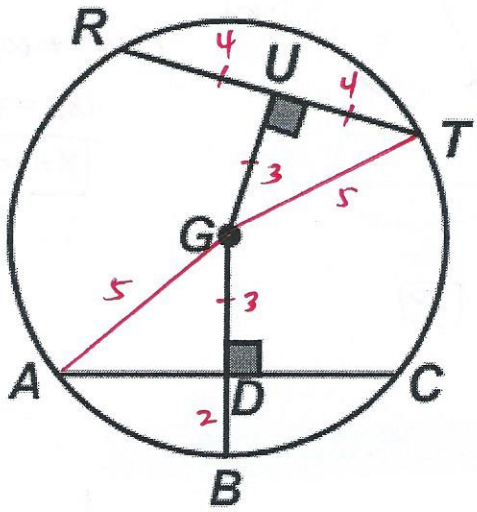
(c) ZD — 15 RADIUS

(d) ZA — 15 RADIUS

(e) ZB — 9 $ZB^2 + 12^2 = 15^2$

(f) BD — 6 $15 - 9$

9. $DG = GU$, $AC = RT$, $UG = 3$, and the radius = 5, find the following.



(a) GD

3

$DG = GU$

(b) GB

5

RADIUS

(c) DB

2

5-3

(d) AG

5

RADIUS

(e) TU

4

$TU^2 + 3^2 = 5^2$

(f) TR

8

4+4