

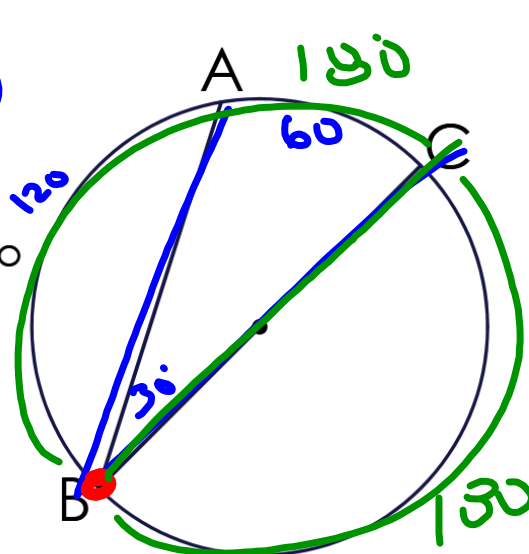
In the circle shown, \overline{BC} is the diameter and the $m\widehat{AB} = 120^\circ$. What is the $m\angle ABC$?

A. 15°

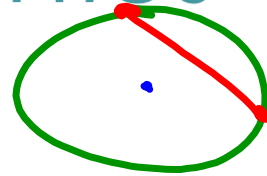
B. 30°

C. 60°

D. 120°

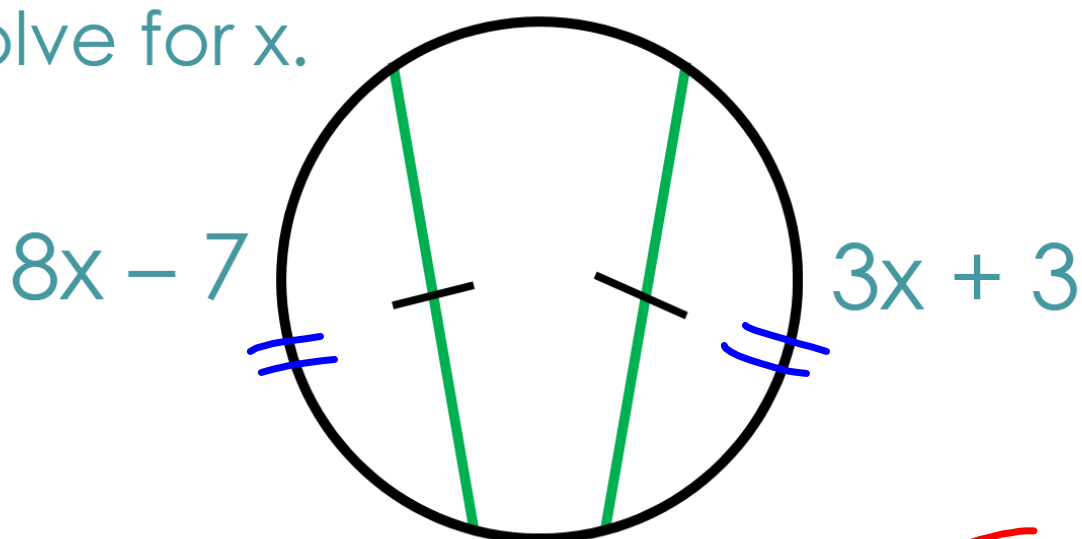


Chord Properties and Segments Lengths in Circles



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

Solve for x.



$$8x - 7 = 3x + 3$$

$$\begin{array}{r} -3x \quad -3x \\ \hline \end{array}$$

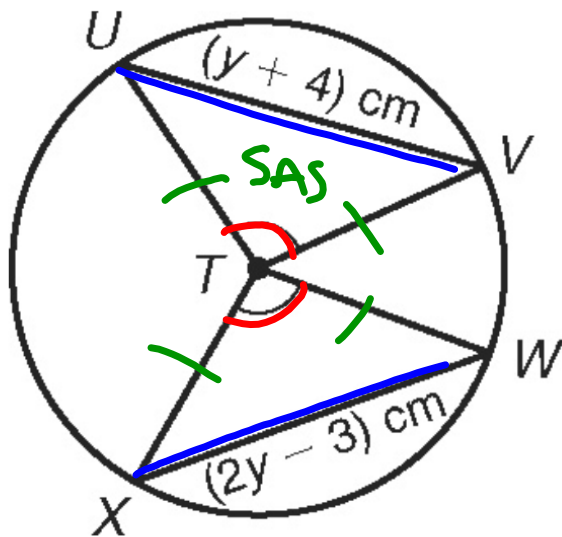
$$5x - 7 = 3$$

$$\begin{array}{r} +7 \quad +7 \\ \hline \end{array}$$

$$5x = 10$$

$$x = 2$$

Find the length of WX.



$$y + 4 = 2y - 3$$

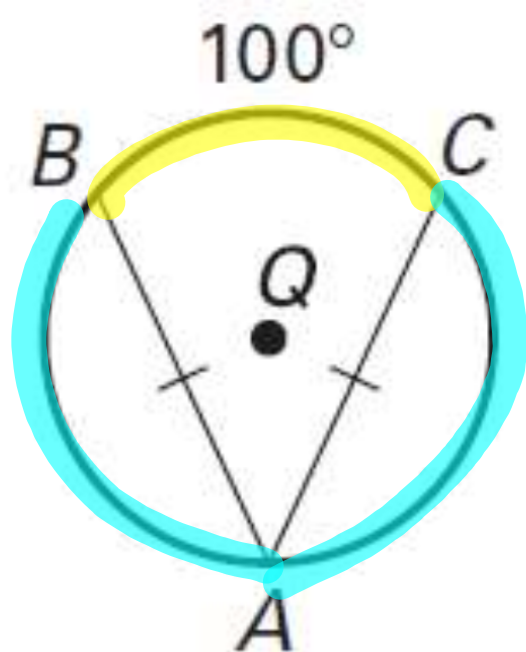
$$\begin{array}{r} +3 \\ \hline \end{array}$$

$$y + 7 = 2y$$

$$\begin{array}{r} -y \\ \hline \end{array}$$

$$7 = y$$

$$WX = 11$$



Find $m\widehat{AB}$

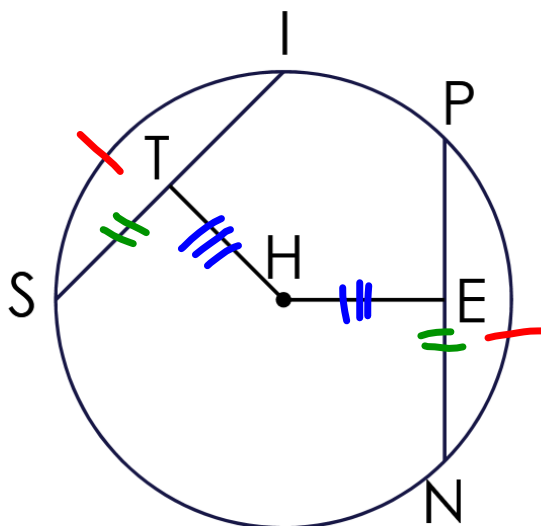
$$\begin{array}{r} 360 \\ - 100 \\ \hline 260 \end{array}$$

$$\frac{260}{2} = \boxed{130^\circ}$$

If two chords are Congruent, then they are equidistant from the center.

In $\odot H$, $\widehat{IS} \cong \widehat{PN}$, $m\overline{TH} = 3x - 11$,
and $m\overline{EH} = 4x - 31$. What is the
value of x ?

$$\begin{array}{r}
 3x - 11 = 4x - 31 \\
 -3x \quad -3x \\
 \hline
 -11 = x - 31 \\
 +31 \quad +31 \\
 \hline
 \boxed{20 = x}
 \end{array}$$



In $\odot U$, U is the midpoint of OR . If $TY = -3x + 56$ and $SD = 4x$, find the length of TY .

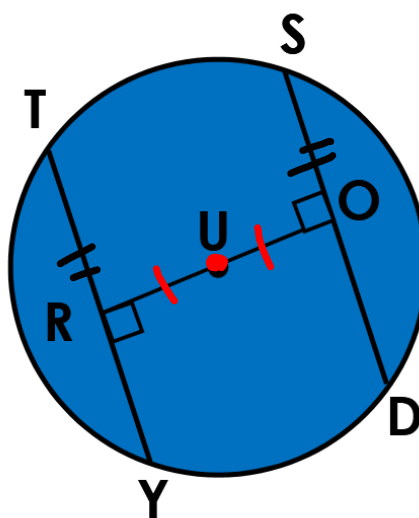
$$\begin{array}{r} -3x + 56 = 4x \\ +3x \quad \quad +3x \\ \hline \end{array}$$

$$\frac{56}{7} = \frac{7x}{7}$$

$$x = 8$$

$$\rightarrow -3(8) + 56$$

$$TY = 32$$



If a diameter is perpendicular (makes a right angle) to a chord, then it also bisects (cuts in half) the chord.

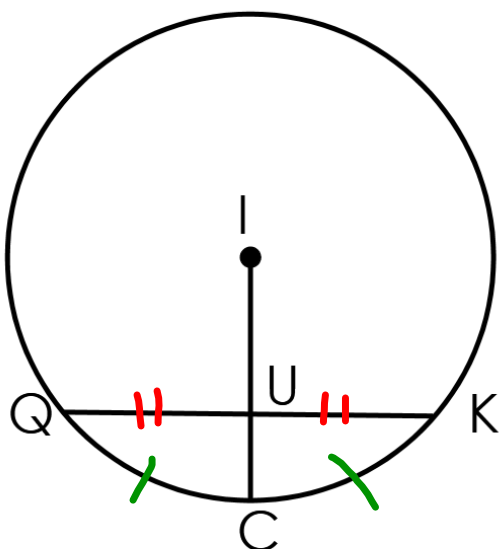
This also results in congruent arcs.

A right triangle can also be formed so you may have to use the

Pythagorean Theorem.

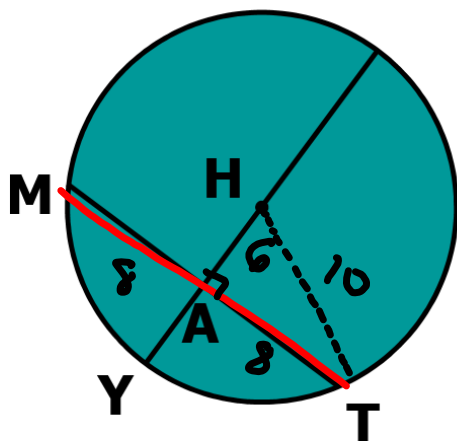
$$\begin{array}{c} a^2 + b^2 = c^2 \\ \text{leg}^2 \quad \text{leg}^2 \quad \text{hyp}^2 \end{array}$$

IN $\odot I$, $\widehat{QC} \cong \widehat{KC}$. If $UK = 2x + 3$
and $UQ = 4x$, find x .



$$\begin{aligned} 2x + 3 &= 4x \\ -2x &\quad -2x \\ \hline 3 &= 2x \\ \frac{3}{2} &= \frac{2x}{2} \\ x &= \frac{3}{2} \text{ or } 1.5 \end{aligned}$$

In $\odot H$, if $\overline{HY} \perp \overline{MT}$, $m\overline{HA} = 6$,
and $m\overline{HT} = 10$, find $m\overline{MT}$.



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

$$a^2 + 6^2 = 10^2$$

$$a^2 + 36 = 100$$

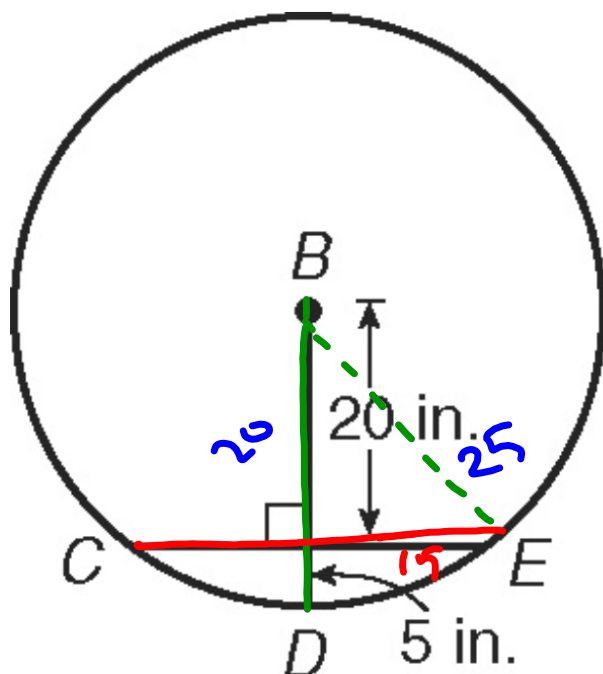
$$\begin{array}{r} a^2 + 36 = 100 \\ -36 \quad -36 \\ \hline \end{array}$$

$$\sqrt{a^2} = \sqrt{64}$$

$$a = 8$$

$$MT = 16$$

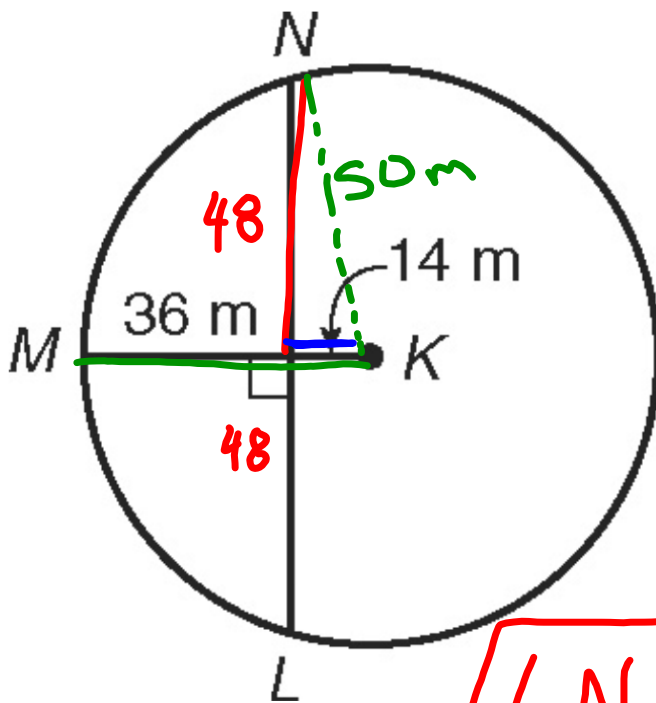
Find the length of CE.



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 a^2 + 20^2 &= 25^2 \\
 a^2 + 400 &= 625 \\
 &\quad -400 \quad -400 \\
 \hline
 \sqrt{a^2} &= \sqrt{225} \\
 a &= 15
 \end{aligned}$$

$$CE = 30 \text{ in}$$

Find the length of LN.

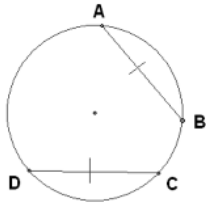


$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 a^2 + 14^2 &= 50^2 \\
 a^2 + 196 &= 2500 \\
 \underline{-196 \quad -196} & \\
 \sqrt{a^2} &= \sqrt{2304} \\
 \boxed{a} &= \boxed{48}
 \end{aligned}$$

$$\boxed{LN = 96 \text{ m}}$$

Properties of Chords

Use the following image for problems 1 and 2.



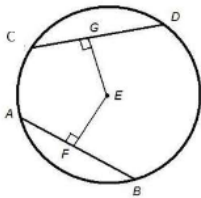
1. If $m\widehat{AB} = 100^\circ$, what is $m\widehat{DC}$?

100°

2. If $m\widehat{AB} = 67^\circ$ and $m\widehat{BC} = 35^\circ$. What is the $m\widehat{AD}$?

191°

Use the following image for questions 3 and 4.



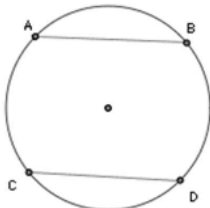
3. If $\widehat{CD} \cong \widehat{AB}$, $m\overline{EG} = 12$ yd., what is the $m\overline{EF}$?

12 yd

4. If $\overline{EG} \cong \overline{EF}$ and $m\widehat{AB} = 24$ m, what is the $m\widehat{CD}$?

24 m

Use the following image for questions 5 and 6.



5. If $m\widehat{AB} = 98^\circ$, $m\overline{AB} = 14$ ft. and $m\widehat{CD} = 98^\circ$, what is the $m\widehat{CD}$?

14 ft.

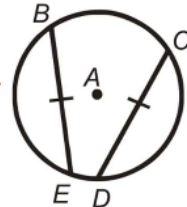
6. if $m\widehat{AB} \cong m\widehat{CD}$, $m\widehat{AC} = 104^\circ$, and $m\widehat{BD} = 100^\circ$ what is the $m\widehat{AB}$?

78°

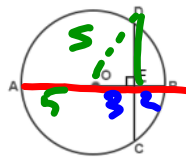
Name _____ Date _____

7. How could you determine that $\widehat{BE} \cong \widehat{CD}$ in the following image?

If chords are \cong , then their arcs are \cong .



Use the following image for the problems 8, 9 and 10.



8. If $m\widehat{DB} = 92^\circ$, what is $m\widehat{DC}$?

92 + 92 = 184°

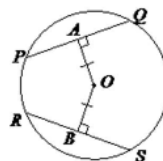
9. If the $m\overline{OE} = 10$ cm and $m\overline{OA} = 15$ cm, what is the $m\overline{BE}$?

radius
5 cm

10. If $m\widehat{AB} = 10$ in., $m\overline{EB} = 2$ in., what is the $m\widehat{DE}$?

diameter
radius = 5 in
 $3^2 + 4^2 = 5^2$
 $a + b^2 = 25$
 $b^2 = 16$
 $b = 4$
 $DE = 4$

Use the following image for problems 11, 12 and 13.



11. If $m\overline{PQ} = 15$ in., what is the $m\overline{RB}$?

Perp. bisector $\frac{15}{2} = 7.5$ in

12. If $m\widehat{PQ} = 90^\circ$, $m\widehat{QS} = 140^\circ$, what is the $m\widehat{RP}$?

360°
- 180°
- 140°
40°

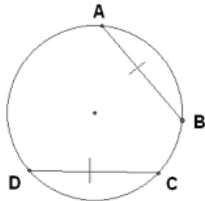
13. If $m\overline{OB} = 10$ cm and $m\overline{AQ} = 24$ cm, what is $m\overline{OQ}$?

(note: \overline{OQ} is not drawn, but you may draw it in.)

$a^2 + b^2 = c^2$
 $10^2 + 24^2 = c^2$
 $c = 26$
 $OQ = 26$ cm

Properties of Chords

Use the following image for problems 14 and 15.



14. If $m\widehat{AB} = 2x + 27$ and $m\widehat{DC} = 4x - 39$ What is the value of x ?

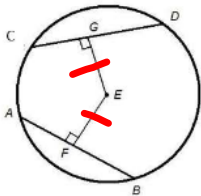
$$2x + 27 = 4x - 39$$

$$x = 33$$

15. If $m\widehat{AB} = 67^\circ$ and $m\widehat{AD} = 135^\circ$. What is the $m\widehat{BC}$?

$$\begin{array}{r} 360 \\ - 67 \\ - 67 \\ - 135 \\ \hline \end{array} \quad m\widehat{BC} = 91^\circ$$

Use the following image for questions 16-18.



16. If $\overline{CD} \cong \overline{AB}$, $m\widehat{EG} = x + 9$, and $m\widehat{EF} = 9x - 7$ What is the value of x ?

$$x + 9 = 9x - 7$$

$$x = 2$$

17. If $m\widehat{AF} = 10x + 2$ and $m\widehat{BF} = 8x + 8$, what is the $m\widehat{AB}$?

$$\begin{array}{l} 10x + 2 = 8x + 8 \\ x = 3 \\ m\widehat{AB} = 2(32) \\ = 64^\circ \end{array}$$

18. If $\overline{EG} \cong \overline{EF}$ and $m\widehat{CD} = 4x + 15$ and

$m\widehat{AB} = 6x - 21$, what is the value of x ?

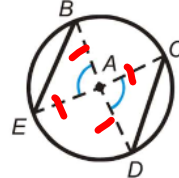
$$4x + 15 = 6x - 21$$

$$x = 18$$

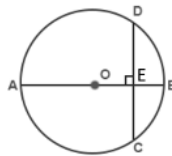
Name _____ Date _____

19. How could you determine that $\overline{BE} \cong \overline{CD}$ in the following image?

radius =
SAS
CPCTC



Use the following image for the problems 20-22.



20. If $m\widehat{DB} = 14x - 12$ and $m\widehat{CB} = 2x + 36$, what is $m\widehat{DC}$?

$$14x - 12 = 2x + 36$$

$$x = 4$$

$$m\widehat{DC} = 88^\circ$$

21. If the radius of the circle is 15 m, and $m\widehat{DE} = 12m$, what is the $m\widehat{OE}$?

$$\begin{array}{l} a^2 + b^2 = c^2 \\ 12^2 + b^2 = 15^2 \\ b^2 = 81 \\ b = 9 \end{array}$$

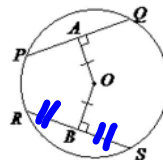
$$OE = 9m$$

22. If $m\widehat{OE} = 5$ and $m\widehat{OA} = 13$, what is the $m\widehat{DC}$?

$$\frac{13}{5} \triangle 12$$

$$DC = 2(12) = 24$$

Use the following image for problems 23 and 24.



23. If $m\widehat{PQ} = 5x + 2$ and $m\widehat{RS} = 3x + 12$ what is the $m\widehat{RB}$?

$$5x + 2 = 3x + 12$$

$$x = 5$$

$$m\widehat{RS} = 3(5) + 12 = 27, \text{ so } \widehat{RB} = 135$$

24. If $m\widehat{PQ} = 87^\circ$, $m\widehat{RP} = 43^\circ$ and $m\widehat{QS} = 7x + 3$ What is the value of x ?

$$\begin{array}{r} 360 \\ - 87 \\ - 87 \\ - 43 \\ \hline 143 \end{array}$$

$$143 = 7x + 3$$

$$x = 20$$

