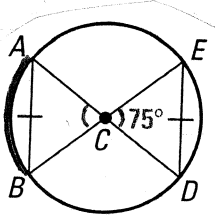
Geometry Ch 10-3 Exer., pg 657 #3-11, 18-19, 23

Find the measure of the red arc or chord.

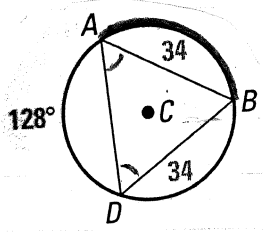
3.



$\angle ACB$ and $\angle ECD$ are congruent angles [vertical] and thus intercept congruent arcs.

$m\widehat{AB} = 75°$

4.



Because $AB \cong DB$,

$\triangle ABD$ is isosceles.

$\angle A \cong \angle D$ and thus

$\widehat{BD} \cong \widehat{BA}$

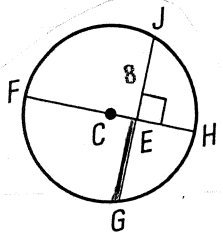
$128 + \widehat{BA} + \widehat{BD} = 360$

$\widehat{BA} + \widehat{BA} = 232$

$2\,\widehat{BA} = 232$

$\widehat{BA} = 116$

5.



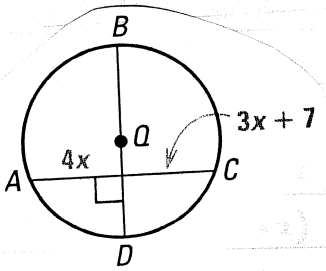
Since $JG \perp FH$,

$JE \cong GE$

$mGE = 8$

Find the value of x in circle Q.

6.

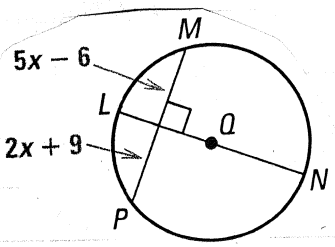


Since $AC \perp BD$, the chord is bisected.

$4x = 3x + 7$

$x = 7$

7.



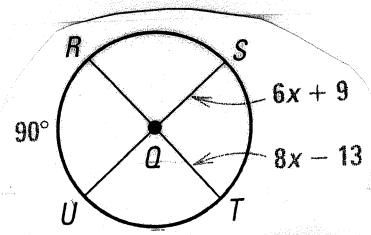
Since $MP \perp LN$, the chord is bisected

$5x - 6 = 2x + 9$

$3x = 15$

$x = 5$

8.



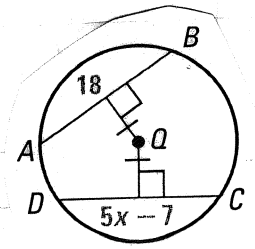
[The 90° arc measure is not relavant] SQ and ST are both radii of the same circle.

$6x + 9 = 8x - 13$

$22 = 2x$

$11 = x$

9.



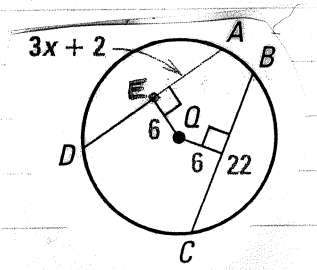
Chords AB and DC are each equidistant from the center.

$18 = 5x - 7$

$25 = 5x$

$5 = x$

10.



Chords DA and CB are each equidistant from the center. As this chord is perpendicular to the center, $DE \cong AE$

Thus, $DA = 2(3x+2)$

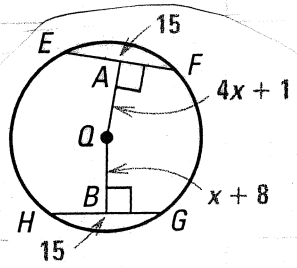
$2(3x+2) = 22$

$6x + 4 = 22$

$6x = 18$

$x = 3$

11.



Chords EF and HG are congruent. Therefore they are equidistant to the center.

$AQ = BQ$

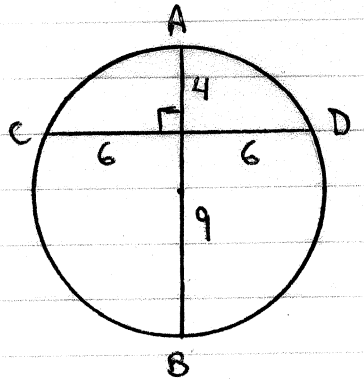
$4x + 1 = x + 8$

$3x = 7$

$x = \frac{7}{3}$

Determine whether $\overline{AB}$ is a diameter of the circle. Explain.

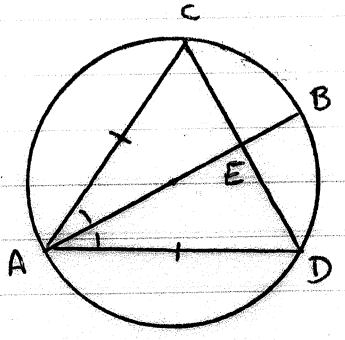
18



$\overline{AB}$ is a perpendicular bisector of chord $\overline{CD}$. Therefore $\overline{AB}$ is a diameter.

Note: CD is <u>not</u> a diameter. While it is perpendicular to chord $\overline{AB}$, it does not bisect it.

19.



$\overline{AC} \cong \overline{AD}$, Given

$\angle CAB \cong \angle DAB$, Given

$\overline{AE} \cong \overline{AE}$, Reflexive

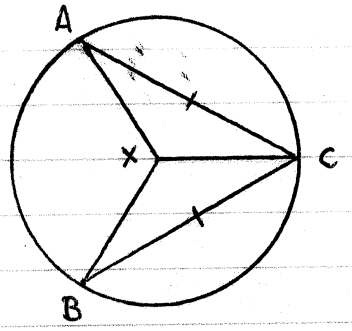
$\triangle ACE \cong \triangle ADE$, S-A-S

$\overline{CE} \cong \overline{DE}$, C.P.C.T.C

The two angles at E [$\angle CEA$ and $\angle DEA$] must be right because they are congruent and form a Linear Pair.

Since $\overline{AB}$ is a perpendicular bisector of $\overline{CD}$, $\overline{AB}$ must be a diameter.

23. <u>ALGEBRA</u>: In circle P, $\overline{AC}$, $\overline{BC}$, and all arcs have integer measures. Show that x must be even.



The arcs of a circle must sum to 360°:

$$\widehat{AB} + \widehat{BC} + \widehat{CA} = 360$$

Since the chords $\overline{BC}$ and $\overline{CA}$ are congruent, their intercepted arcs must also be congruent.

$$\widehat{AB} + \widehat{BC} + \widehat{BC} = 360$$
$$\widehat{AB} = 360 - 2\widehat{BC}$$

Whatever integer measure of $\widehat{BC}$, twice the measure will be an even number. The difference of two even numbers is an even number. Thus $\widehat{AB}$ must be even, and the central angle that intercepts it is also even.