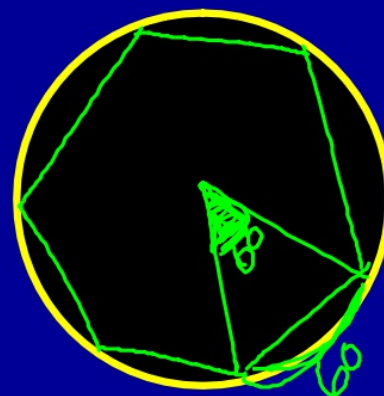


SECTION 12.3: ARCS & CENTRAL ANGLES



Standards:

7.0 - Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals, and the properties of circles.

17.0 - Students prove theorems by using coordinate geometry, including the midpoint of a line segment, the distance formula, and various forms of equations of lines and circles.

WARMUP #3

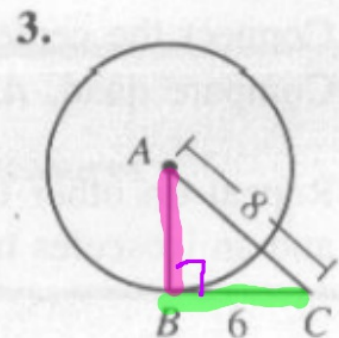
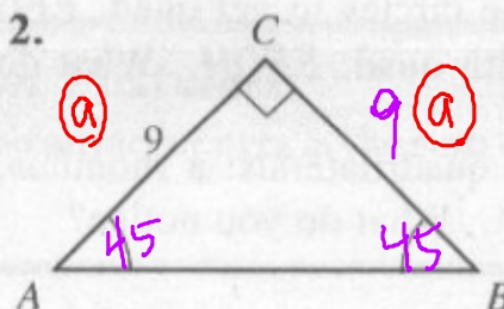
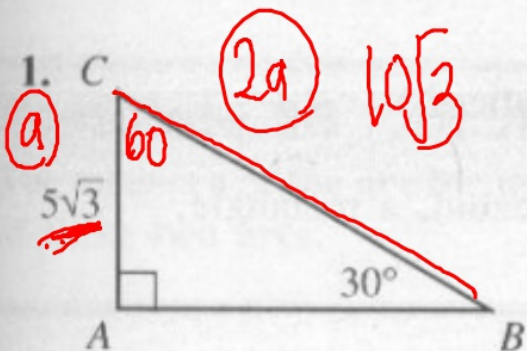
Page 337 MR #1-3

$$\begin{array}{r}
 x^2 + 36 = 64 \\
 \underline{-36 \quad -36} \\
 \sqrt{x^2} = \sqrt{28} \\
 x = 2\sqrt{7}
 \end{array}$$



Mixed Review Exercises

Find AB . In Exercise 3, \overline{CB} is tangent to $\odot A$.



$$\begin{array}{l}
 \sqrt{3}a = 15 \\
 \sqrt{3} \cdot 5\sqrt{3} = 15 \\
 5 \cdot 3 = 15
 \end{array}$$

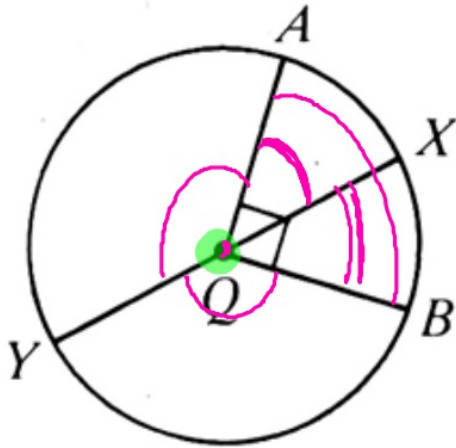
$$\begin{array}{l}
 \sqrt{2}a \\
 9\sqrt{2}
 \end{array}$$

CENTRAL ANGLE

A central angle is an angle with its vertex at the center of a circle.

$\angle YQA, \angle AQX, \angle BQY$

$\angle BOX \quad \angle AQB$



ARC

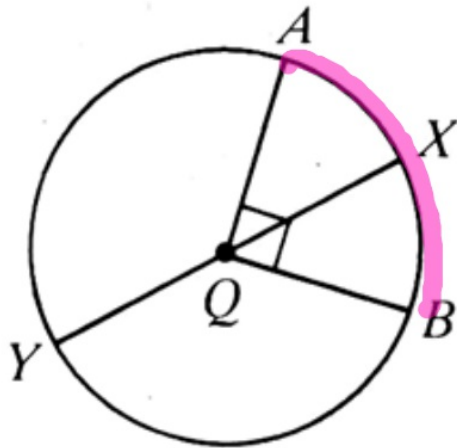


An arc is an unbroken part of a circle

MINOR ARC

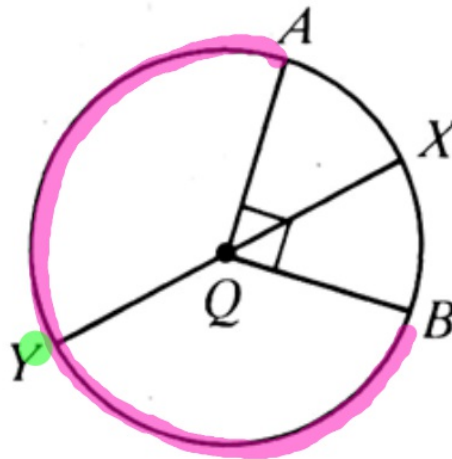
\widehat{AB} is a minor arc

\widehat{AXB}



MAJOR ARC

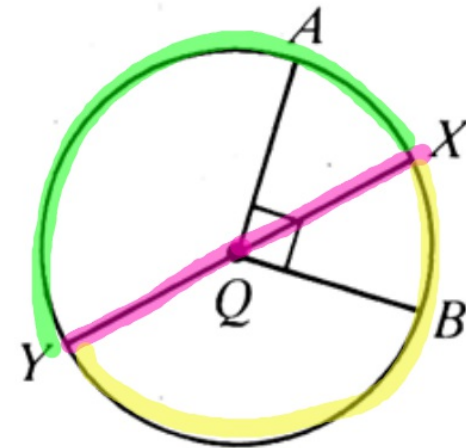
\widehat{AYB} is a major arc



SEMICIRCLE

If the endpoints of an arc are on a diameter, it is a semicircle

\widehat{YAX} ; \widehat{XBY}

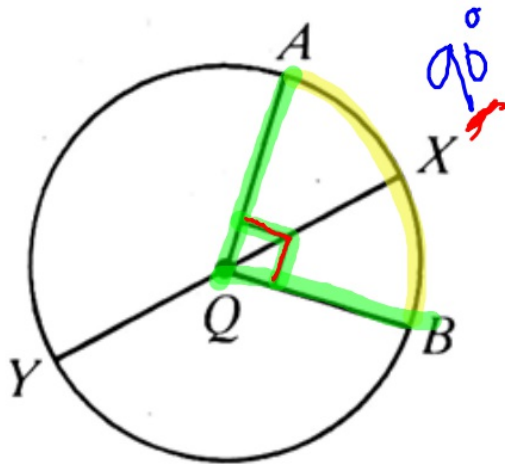


MEASURE OF AN ARC

MINOR ARC

The measure of a minor arc is the measure of its central angle less than 180°

$$m(\widehat{AB}) = 90^\circ$$



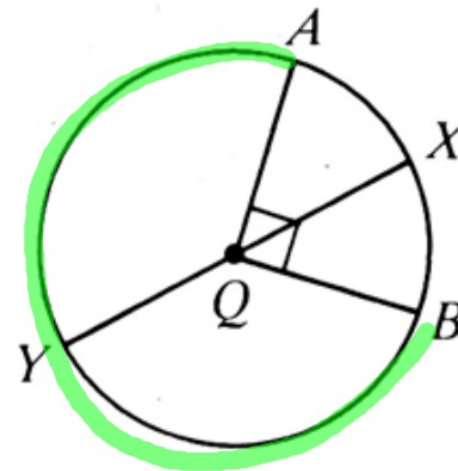
MAJOR ARC

The measure of a major arc is $360 -$ (measure of its minor arc)

$$m(\widehat{AYB}) = 360 - m(\widehat{AB}) = 270$$

between 180 and 360

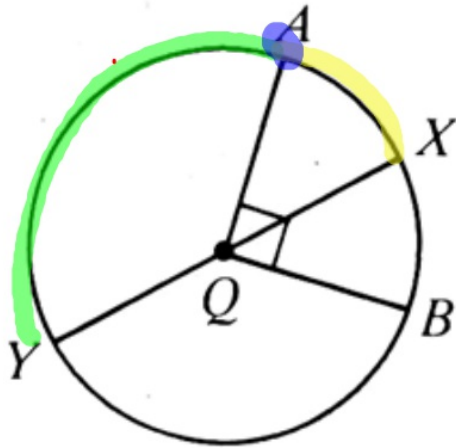
(semicircle = 180)



$$\begin{array}{r} 360 \\ - 90 \\ \hline 270^\circ \end{array}$$

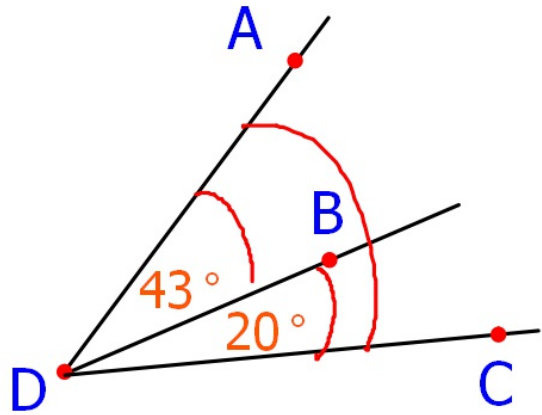
ADJACENT ARCS

adjacent arcs of a circle are arcs with **EXACTLY** one point in common
in common



\widehat{YA} and \widehat{AX}





$$m \angle ADC = \underline{63}$$

Why?

What is the reason

angle addition
postulate



$$XZ = \underline{13}$$

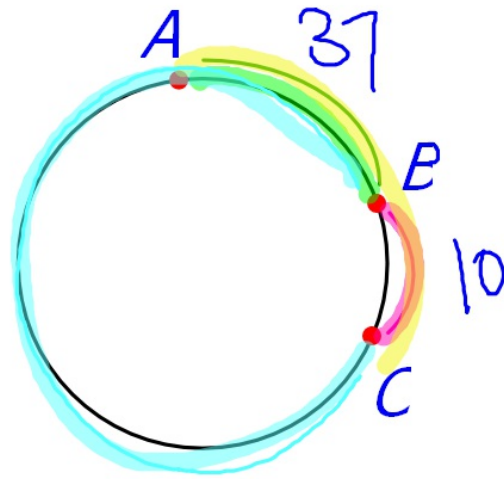
Why?

What is the reason

segment addition

postulate

So,



$$m \widehat{AB} = 37^\circ$$

$$m \widehat{BC} = 10^\circ$$

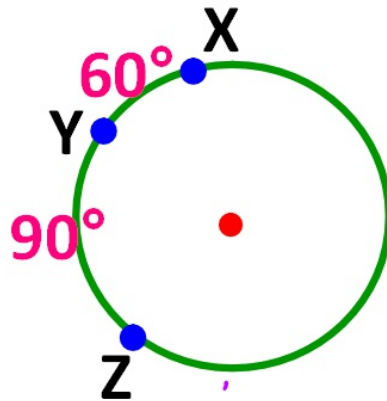
$$m \widehat{AC} = \underline{47}$$

$$m \widehat{BAC} = \underline{350} \frac{360}{-10}$$



ARC ADDITION POSTULATE

The measure of the arc formed by two adjacent arcs is the sum of the measures of these two arcs



$$m(\widehat{XZ}) = m(\widehat{XY}) + m(\widehat{YZ})$$

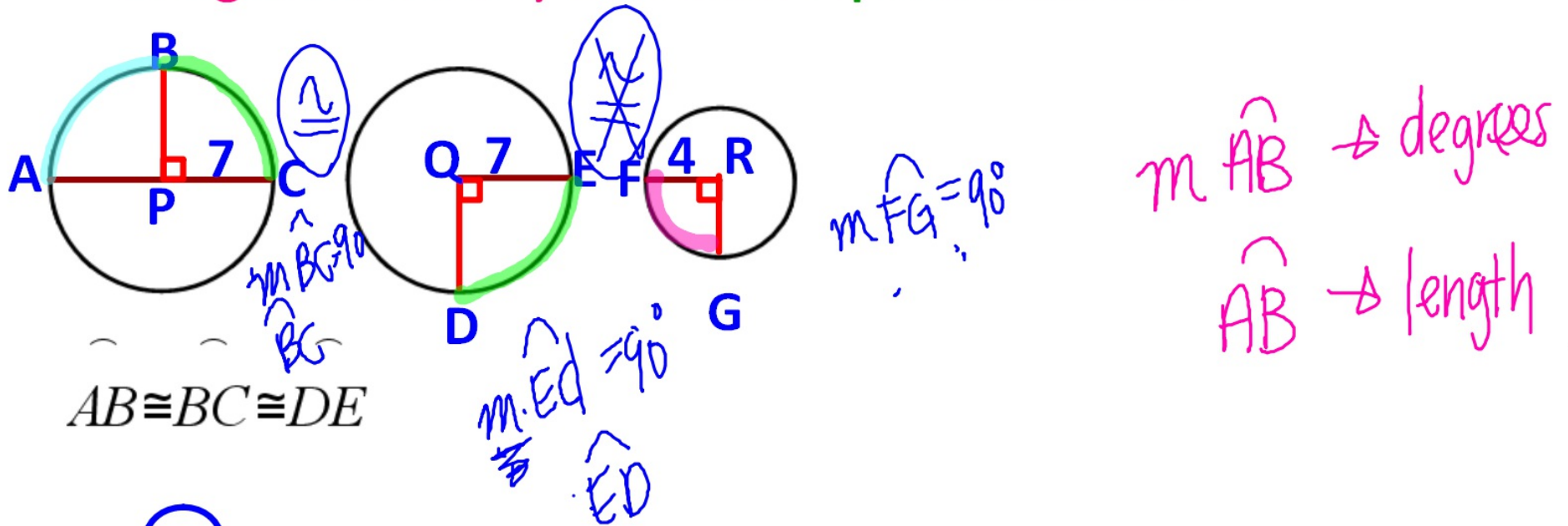
$$m(\widehat{XZ}) = 60 + 90$$

$$m(\widehat{XZ}) = 150$$



CONGRUENT ARCS

Congruent arcs are arcs in the same circle (or congruent circles) that have equal measures.

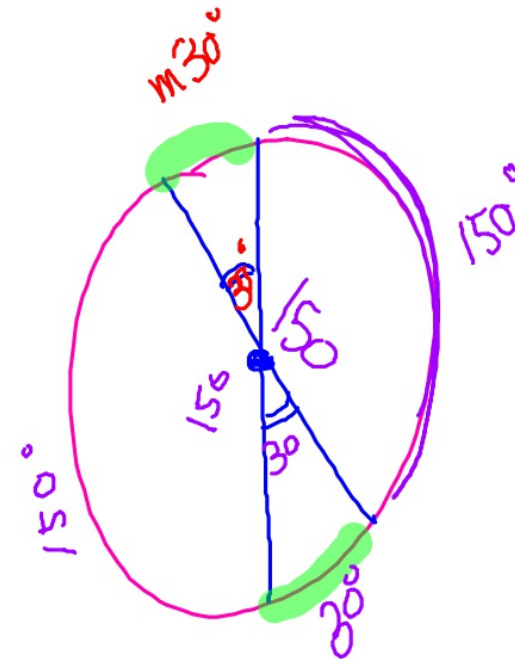


but \widehat{FG} is not congruent since the circles aren't congruent

Arc length

THEOREM

In the same circle (or in congruent circles), two minor arcs are congruent if and only if their central angles are congruent.



In $\odot C$, find the measure of each arc or angle named.

★ $\angle PCQ$ 60

★ \widehat{SQ} 120

★ \widehat{SPQ} 240 360
-120

★ \widehat{SPT} 315 360
-45

★ \widehat{ST} 45

★ $\angle SCQ$ 120

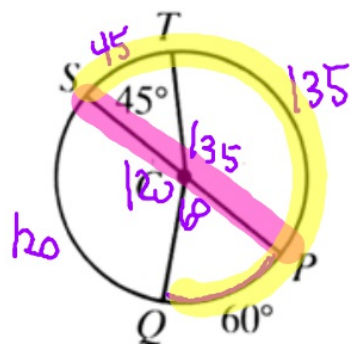
★ \widehat{PT} 135

★ \widehat{TSQ} 165 45 + 120

★ \widehat{SQP} 180 120 + 60

★ $\angle SCP$ 180

★ $\angle TCP$ 135



The figure shows two concentric circles with center N . Classify each statement as true or false.

★ $m\widehat{BC} = 45$ **T**

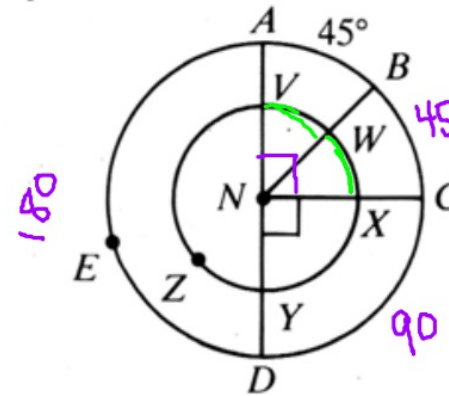
★ $m\angle DNC = 90$ **T**

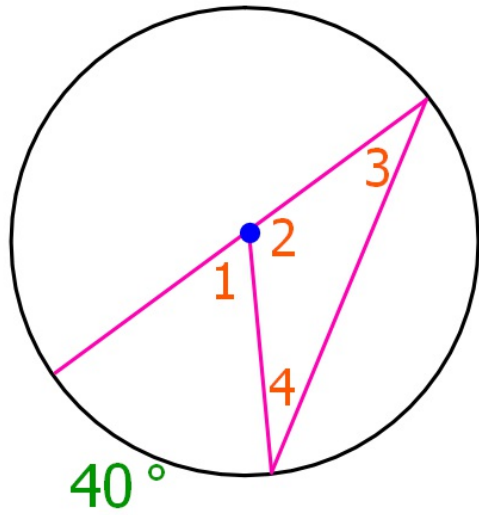
★ $\widehat{VW} \cong \widehat{WX}$ **T**

★ $\widehat{AB} \cong \widehat{VW}$ **F**

★ $m\widehat{XY} = 45$ **F**

★ $\widehat{AED} \cong \widehat{VZY}$ **F**



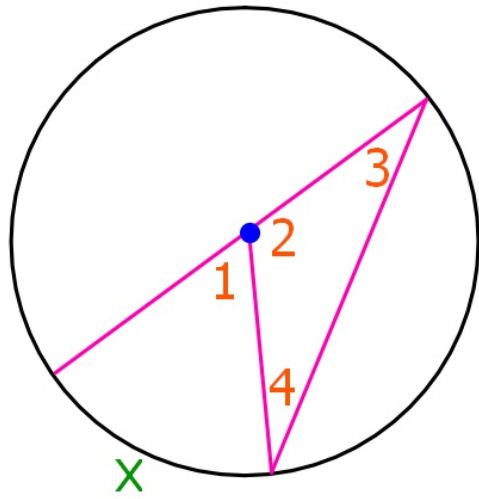


$$m\angle 1 = \underline{\hspace{2cm}}$$

$$m\angle 2 = \underline{\hspace{2cm}}$$

$$m\angle 3 = \underline{\hspace{2cm}}$$

$$m\angle 4 = \underline{\hspace{2cm}}$$

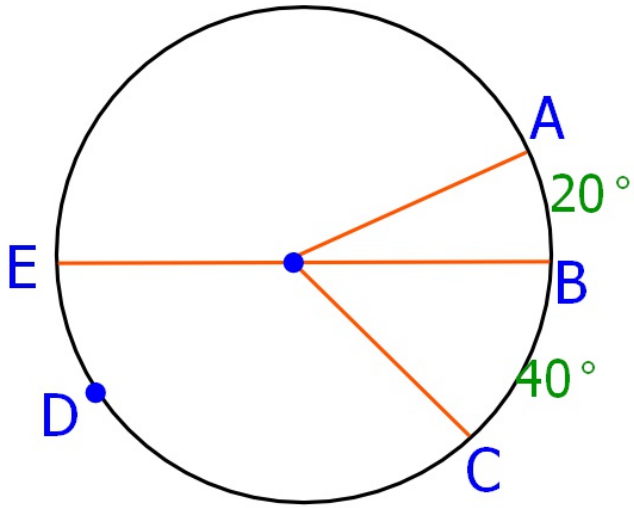


$$m\angle 1 = \text{-----}$$

$$m\angle 2 = \text{-----}$$

$$m\angle 3 = \text{-----}$$

$$m\angle 4 = \text{-----}$$



$$m \widehat{AC} = \underline{\hspace{2cm}}$$

$$m \widehat{BDC} = \underline{\hspace{2cm}}$$

$$m \widehat{EC} = \underline{\hspace{2cm}}$$

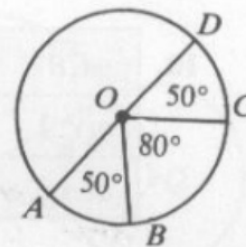
HOMWORK

HW 12.3

- Pg. 341 (CE): # 1-13
- Pg. 341 (WE): #1-8, 10a-c, 11a-c

Classroom Exercises

1. Using the letters shown in the diagram, name:
- two central angles
 - a semicircle
 - two minor arcs
 - two major arcs

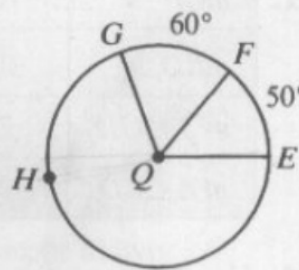


In Exercises 2–7 find the measure of the arc.

- \widehat{AB}
- \widehat{BAD}
- \widehat{AC}
- \widehat{CDA}
- \widehat{ABD}
- \widehat{CDB}

In Exercises 8–13 find the measure of the angle or the arc named.

- $\angle GQF$
- $\angle EQF$
- $\angle GQE$
- \widehat{GE}
- \widehat{GHE}
- \widehat{EHF}

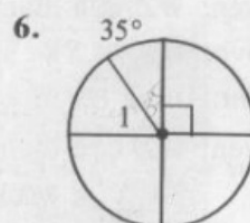
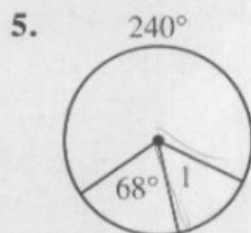
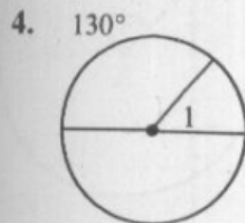
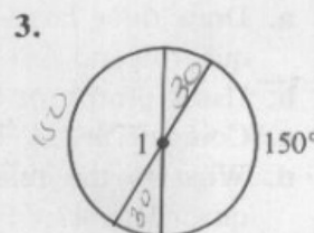
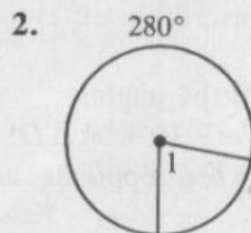
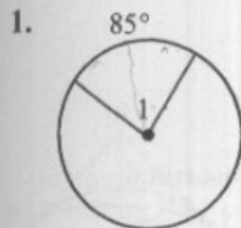


HW 12.3

- Pg. 341 (CE): # 1-13
- Pg. 341 (WE) #1-8, 10a-c, 11a-c

Written Exercises

Find the measure of central $\angle 1$.

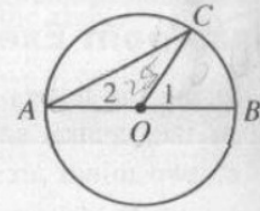


- At 11 o'clock the hands of a clock form an angle of $\underline{\quad ? \quad}^\circ$.
- The hands of a clock form a 120° angle at $\underline{\quad ? \quad}$ o'clock and at $\underline{\quad ? \quad}$ o'clock.

Complete the tables in Exercises 10 and 11.

10.

$m\widehat{CB}$	60	70	?	?	?
$m\angle 1$?	?	56	?	?
$m\angle 2$?	?	?	25	x



11.

$m\widehat{CB}$	70	60	66	60	p
$m\widehat{BD}$	30	28	?	?	q
$m\angle COD$?	?	100	?	?
$m\angle CAD$?	?	?	52	?

