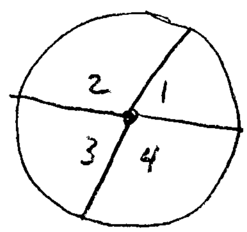
Ch 10-2 Angles and Arcs

CENTRAL ANGLE — AN angle with the center of A circle at ONE VERTEX and its two sides ARE radii of the circle.

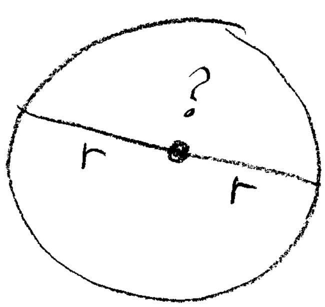
(Ex) 

$\angle$s 1, 2, 3, and 4 ARE central $\angle$s.

What is the measure of $\angle 1 + \angle 2 + \angle 3 + \angle 4$?

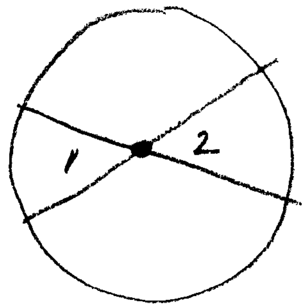
$\boxed{360^\circ}$

(Ex) What is the measure of the central angle if the 2 radii are part of the same diameter?



$\boxed{180^\circ}$

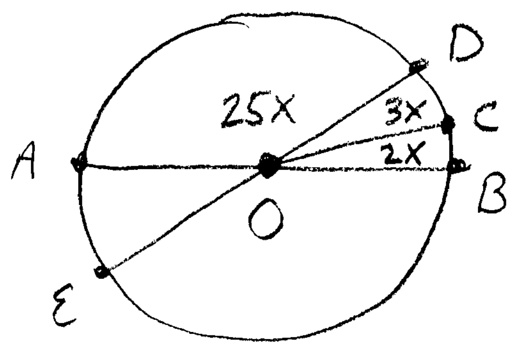
How do central ∠1 and ∠2 compare?



Congruent, because they are vertical ∠s

EX1 (A) Find m∠AOD in ⊙O
Pg529

poor choice of name!!
"Circle 'OH'"



$\angle DOC = 3x^\circ$
$\angle COB = 2x^\circ$
$\angle AOD = 25x^\circ$

Since ∠AOD + ∠DOB are a linear pair

$$25x + 5x = 180^\circ$$

$$30x = 180$$

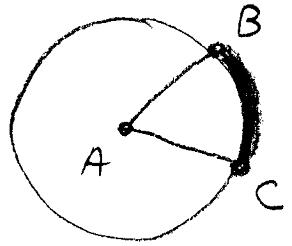
$$x = \frac{180}{30} = 6^\circ$$

$$\therefore \boxed{m\angle AOD = 25(6) = 150^\circ}$$

(B) $m\angle AOE = ?$ $\boxed{5(6) = 30^\circ = m\angle AOE}$

Arc the part of the circle "subtended" by A central angle

(Ex)



Arc $\overset{\frown}{BC}$ is formed by central angle $\angle BAC$

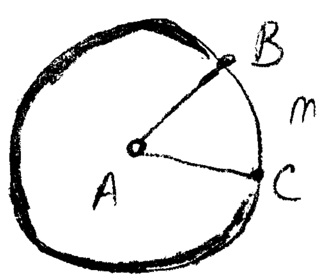
$\overset{\frown}{BC}$ ← symbol for Arc, be Neat!

Minor ARC AN Arc $< 180°$

Major ARC AN Arc $> 180°$

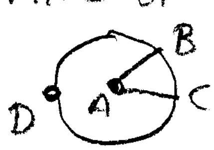
A central angle makes ONE minor And ONE major ARC. How would you name the major Arc below?

major ARC → ?



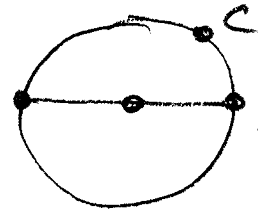
minor Arc $\overset{\frown}{BC}$

Answer, you need to find or create A point on the major Arc



$\Rightarrow$ $\overset{\frown}{BDC} \cong \overset{\frown}{CDB}$ major Arc semicircle   AN ARC THAT $= 180°$

(EX)



$\overset{\frown}{ACB}$
semicircle

MAJOR ARCS AND semicircles ARE NAMED by the two endpoints with the 3^{RD} point ON the ARC AS the middle letter.

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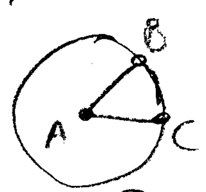
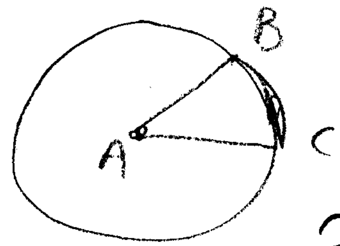
central Angles AND their Arcs ARE both measured in degrees. There is ONE important difference. Arcs CAN also be measured in length! But <u>only</u> if you know the radius.

A $30°$ Angle AND ARC ARE the same degree for ANY circle:



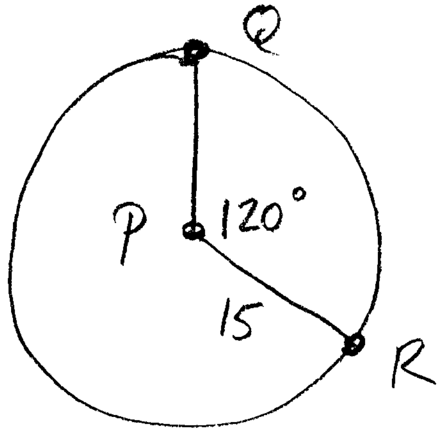


$m\angle A = m\overset{\frown}{BC} = 30°$ $m\angle A = m\overset{\frown}{BC} = 30°$

But the measure of the length of $\overset{\frown}{BC}$ is different because the circles ARE not the same size.

Finding Arc length

Ex 4 Pg 532 In $\odot P$, $PR = 15$ $m\angle QPR = 120°$
Find length of $\widehat{QR}$



Since the total degrees around the circle is 360°. $m\angle QPR$ is $\frac{120}{360}$ part of the circle.

The total distance around the circle $C = 2\pi r$ so $m\,\widehat{QR}$ is the same part of $2\pi(15) = 30\pi$

$$\frac{120}{360} = \frac{\widehat{QR}}{30\pi} \quad \therefore \overset{5}{\cancel{30}}\pi\left(\frac{12\cancel{0}}{\underset{6}{\cancel{36}}\cancel{0}}\right) = \widehat{QR}$$

$\therefore$ $\boxed{10\pi = \widehat{QR}}$ EXACT

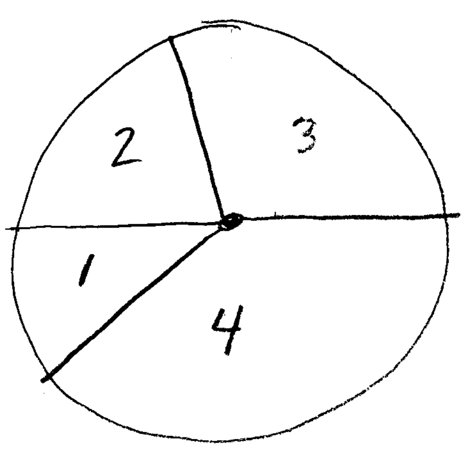
or $\boxed{31.42 \approx \widehat{QR}}$ Approx.

A common use of central angles are in Pie Charts = Circle Graphs.

Ex) Express 1, 2, 3, 4 as a circle graph.

Make a table, for each number you need to find its % of total which you then take that part of 360° to find its central angle.

Number	% of total	Part of 360°
1	$\frac{1}{10} = 10\%$	$\frac{1}{10}(360) = 36°$
2	$\frac{2}{10} = 20\%$	$\frac{2}{10}(360) = 72°$
3	$\frac{3}{10} = 30\%$	$\frac{3}{10}(360) = 108°$
4	$\frac{4}{10} = 40\%$	$\frac{4}{10}(360) = 144°$
		360° ✓



*TIP: Enter WolframAlpha "Pie Chart 1, 2, 3, 4"

A few more notes about Angles & Arcs:

Theorem 10.1 ⇒ In two ≅ ⊙, 2 Arcs are ≅ iff their central Angles are ≅

Minor Arcs may or may not be named using 3 letters, major Arcs or semicircles must use 3 letters.

Study example 3 on pg 531 for another example of making a Pie Chart

Homework: Pg. 532-533 # 1-13 odd
#20, 32.