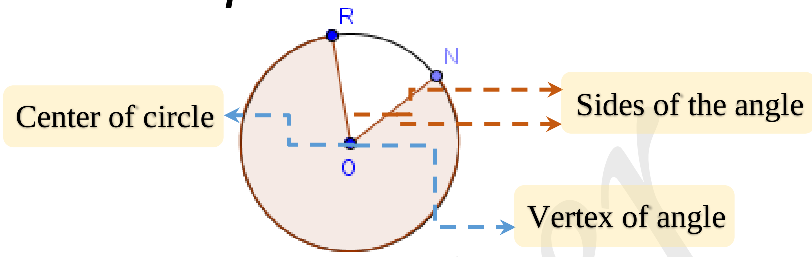
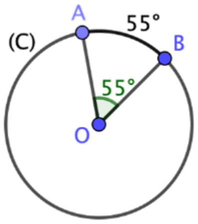
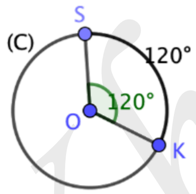
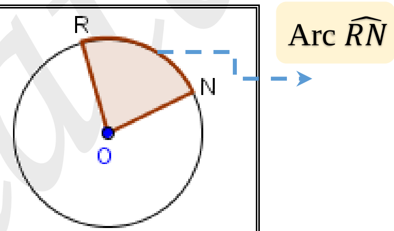
ξ ***Central angle***:

Def: is an angle whose ***vertex is the center of the circle*** and its sides intersect the circle ***at two distinct points***.

$R\hat{O}N$ *is a* *central angle.*



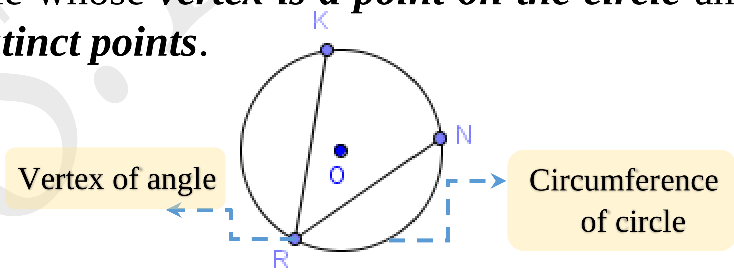
ξ *Property*: Measure of central angle is equal to measure of the arc it intercepts.

Graphically			
In symbols	$A\hat{O}B = mes\widehat{AB}$	$S\hat{O}K = mes\widehat{SK}$	$R\hat{O}N = mes\widehat{RN}$

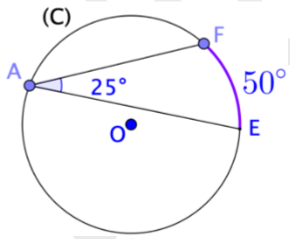
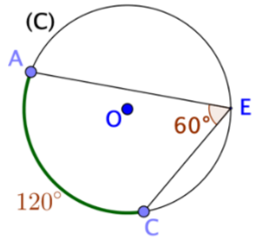
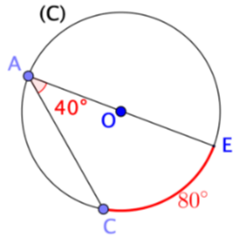
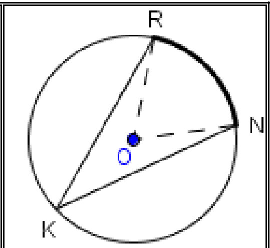
ξ ***Inscribed angle:***

Def: An ***inscribed angle*** is an angle whose ***vertex is a point on the circle*** and sides intersect the circle ***in two distinct points***.

$K\hat{R}N$ *is an* *inscribed angle.*



ξ *Property-*: Measure of inscribed angle equals half measure of intercepted arc.

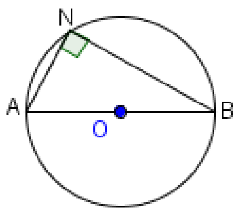
Graphically				
In symbols	$F\hat{A}E = 25°$ $mes\widehat{FE} = 50°$ So, $F\hat{A}E = \frac{1}{2}mes\widehat{FE}$	$A\hat{E}C = 60°$ $mes\widehat{AC} = 120°$ So, $\widehat{AEC} = \frac{1}{2}mes\widehat{AC}$	$A\hat{E}C = 60°$ $mes\widehat{AC} = 120°$ So, $\widehat{AEC} = \frac{1}{2}mes\widehat{AC}$	$R\hat{O}N = mes\widehat{RN}$

ξ *Property-3*: Measure of the ***inscribed angle facing the diameter*** is equal to 90°.

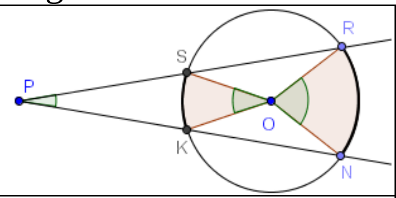
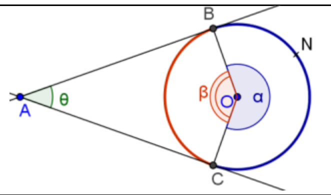
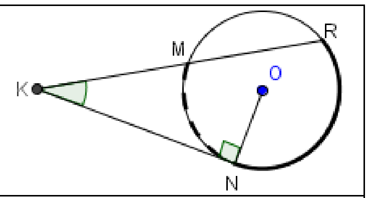
Decoding: If N is a point on $(C)$and $[AB]$ is a diameter of (C).

$$\textbf{then, } A\hat{N}B = \frac{A\hat{O}B}{2} = \frac{180°}{2}$$

Thus, $A\hat{N}B = 90°$. (Thales' 5th theorem)

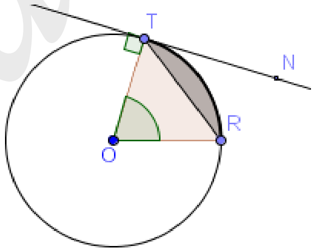


ξ Types of exterior angles:

Graphical form:			
Description: Exterior angle formed between	Two secants	Two tangents	A secant & a tangent
Measure:	$R\hat{P}N = mes\frac{\widehat{RN} - \widehat{SK}}{2}$	$B\hat{A}C = mes\frac{\widehat{BNC} - \widehat{BC}}{2}$	$R\hat{K}N = mes\frac{\widehat{RN} - \widehat{MN}}{2}$
In words	Angle between ***2 secants***	Angle between two tangents	Angle between a ***tangent*** & a ***secant***
	issued from an exterior point equals half the difference of the two intercepted arcs.		

ξ *Angle between tangent and chord:*

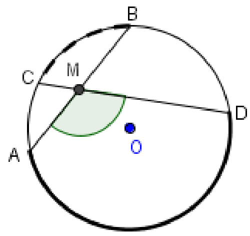
Def₃: is an angle issued from the point of tangency and it is equal to half the intercepted arc.



Decoding: If $[TN)$ is a tangent to (c) at T. and $[TR]$ is a chord of (c)

Then, $R\hat{T}N = mes\frac{\widehat{TR}}{2}$

ξ *Interior angle:* Angle enclosed between ***two chords intersecting inside the circle*** equals half the sum of the two intercepted arcs.



Proof: In triangle ACM *we have*:

$A\hat{M}D = M\hat{A}C + A\hat{C}M$ (Exterior angle equals sum of opposite interior angles in a triangle (flag rule) check E.S-6.)

But, points A, M & B are collinear (given)

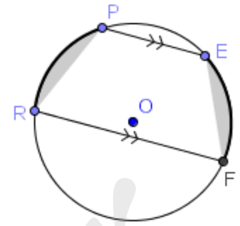
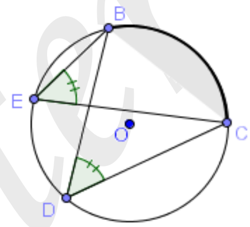
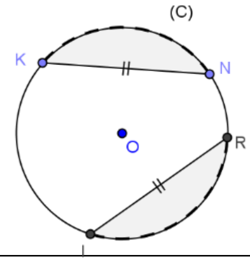
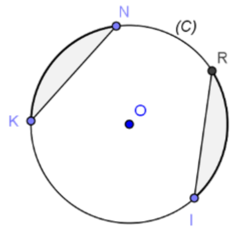
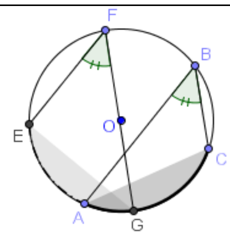
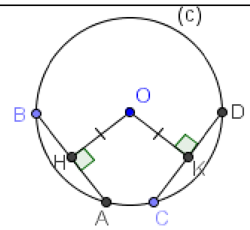
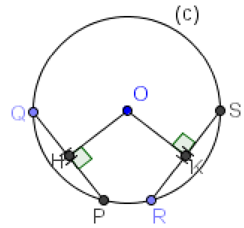
And, points C, M & D are collinear (given)

So, $M\hat{A}C = mes\frac{\widehat{BC}}{2}$ (inscribed angle)

And, $A\hat{C}M = mes\frac{\widehat{AD}}{2}$ (inscribed angle)

Thus, $A\hat{M}D = mes\frac{\widehat{AD}+\widehat{BC}}{2}$

Some properties of arcs and angles

Property	*Description*	*If*	*Then*	*Graph*
1	***Arcs*** included between ***parallel chords*** in a circle are ***equal***.	$[PE] \parallel [RF]$	$\widehat{PR} = \widehat{EF}$	
2	***Inscribed angles intercepting the same arc are equal***	$B\hat{E}C$ And $B\hat{D}C$ intercepts same arc $\widehat{BC}$	$B\hat{E}C = B\hat{D}C$ $= mes\frac{\widehat{BC}}{2}$	
3	***Equal chords subtend equal arcs***.	Chords KN & IR are equal	**Then,** $\widehat{KN} = \widehat{IR}$	
4	***Equal arcs subtend equal chords***	$\widehat{KN} = \widehat{IR}$	***Then,*** Chords KN & IR are equal	
5	***Equal angles intercept equal arcs*** and vice versa	If, $E\hat{F}G = A\hat{B}C$.	**Then,** $\widehat{EG} = \widehat{AC}$	
6	***Chords equidistant from the center of the circle are equal***.	If $OH = OK$	***Then,*** chords AB & CD are equal	
7	***Equal chords are equidistant from the center***.	***If,*** Chords QP & RS are equal	***Then,*** $OH = OK$ **Or** O is equidistant from points H & K	

Rule-1:

(Perimeter of a circle): $2\pi R \longrightarrow 360^o$ (***Greatest angle in a circle***)

(Length of an arc): $L \longrightarrow R\hat{O}N$ (***Central angle corresponding to L***)

$$\text{Length of an arc} = \frac{2\pi R \times R\hat{O}N}{360^\circ}$$

Rule-2:

(Area of a circle): $\pi R^2 \longrightarrow 360^\circ$ (***Greatest angle in a circle***)

(Area of a circular sector): A $\longrightarrow R\hat{O}N$ (***Central angle corresponding to A***)

$$\text{Area of } a \text{ circular sector} = \frac{\pi R^2 \times R\hat{O}N}{360^\circ}$$