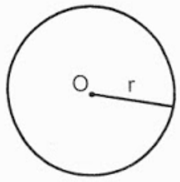
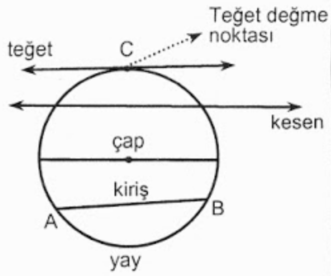
ÇEMBER VE DAİRE HAKKINDA GENEL HATIRLATMALAR

ÇEMBERİN ELEMANLARI

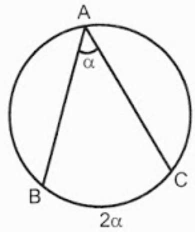




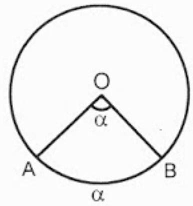
Çevre = 2.π.r

Alan = π.r²

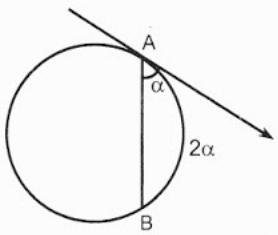
Çevre açı



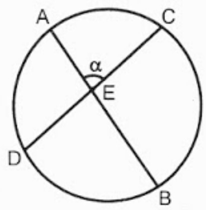
Merkez açı



Teğet - kiriş açı

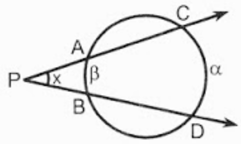


İç açı

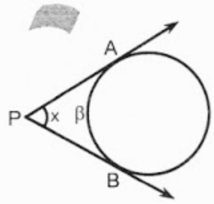


$$\alpha = \frac{m(\overset{\frown}{AC}) + m(\overset{\frown}{DB})}{2}$$

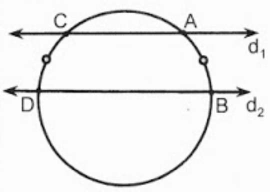
Dış açı



$$x = \frac{\alpha - \beta}{2}$$

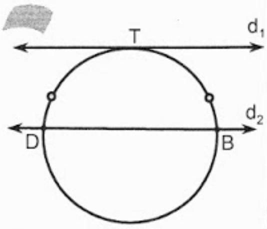


$x + \beta = 180°$



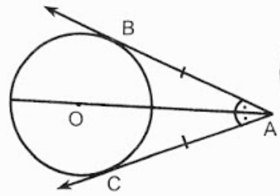
$d_1 // d_2$ ise

$|\overset{\frown}{AB}| = |\overset{\frown}{CD}|$



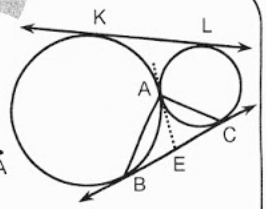
$d_1 // d_2$ ise

$|\overset{\frown}{TD}| = |\overset{\frown}{TB}|$



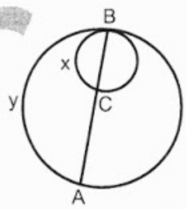
|AB| = |AC|

[AO], açıortay



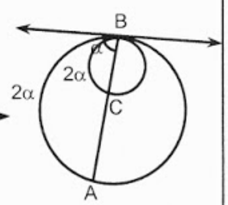
[AB] ⊥ [AC], |BC| = |KL|

(|AE| = |EB| = |EC| olduğundan)

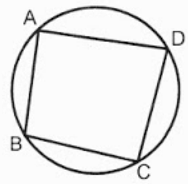


x = y

İspatı:



Kirişler dörtgeni

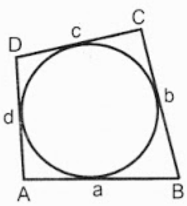


$m(\widehat{A}) + m(\widehat{C}) = 180°$

$m(\widehat{B}) + m(\widehat{D}) = 180°$

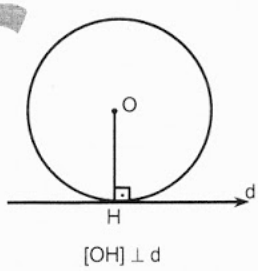
Örn: dikdörtgen, kare, ikizkenar yamuk

Teğetler dörtgeni



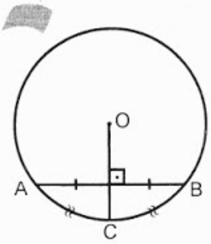
a + c = b + d

Örn: Kare, eşkenar dörtgen, deltoid

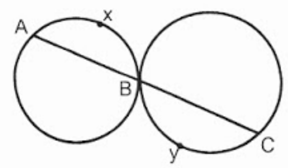


[OH] ⊥ d

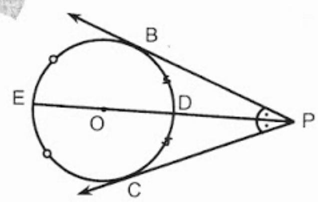
Merkezden teğete inilen yarıçap, teğet değme noktasında teğete diktir.



Merkezden kirişe inilen dikme, kirişi ve kirişin yayını eşit iki parçaya böler.

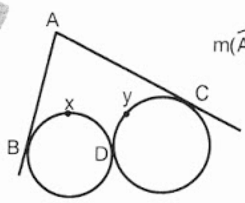


$m(\overset{\frown}{AxB}) = m(\overset{\frown}{ByC})$

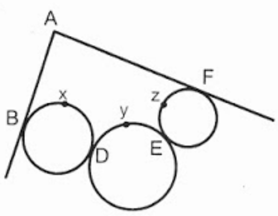


$m(\overset{\frown}{BD}) = m(\overset{\frown}{DC})$

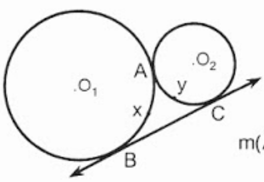
$m(\overset{\frown}{BE}) = m(\overset{\frown}{EC})$



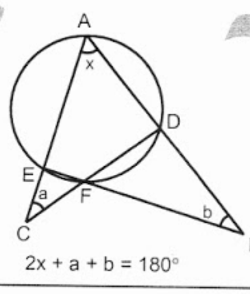
$m(\widehat{A}) + m(\overset{\frown}{BxD}) + m(\overset{\frown}{DyC}) = 360^\circ$



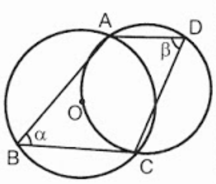
$m(\widehat{A}) + m(\overset{\frown}{BxD}) + m(\overset{\frown}{DyE}) + m(\overset{\frown}{EzF}) = 540^\circ$



$m(\overset{\frown}{AxB}) + m(\overset{\frown}{AyC}) = 180^\circ$

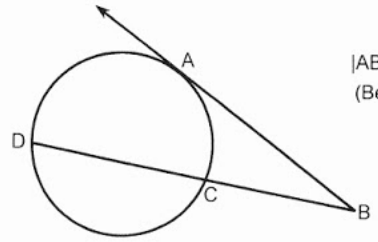


$2x + a + b = 180^\circ$

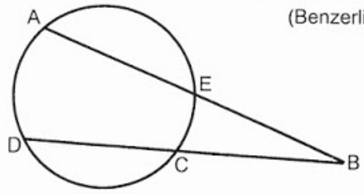


$2\alpha + \beta = 180^\circ$

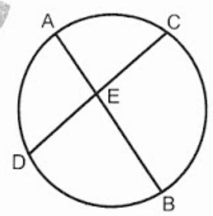
ÇEMBERDE KUVVET



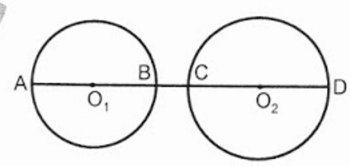
$|AB|^2 = |BC| . |BD|$
(Benzerlikten)



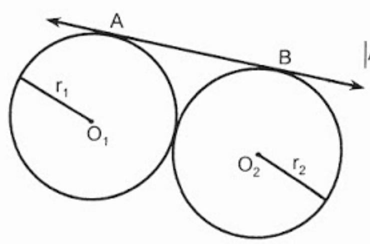
$|BE| . |BA| = |BC| . |BD|$
(Benzerlikten)



$|AE| . |EB| = |DE| . |EC|$
(Benzerlikten)

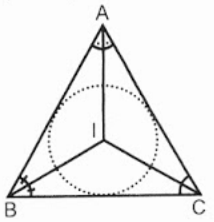


Çemberler arasındaki
- En kısa mesafe: $|BC|$
- En uzun mesafe: $|AD|$



$|AB| = 2\sqrt{r_1 . r_2}$

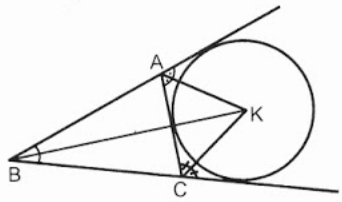
ÜÇGENİN ÖNEMLİ MERKEZLERİ



I: $\overset{\triangle}{ABC}$ nin iç teğet çemberinin merkezi

(açıortayların kesim noktası)

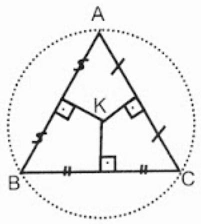
Dış teğet çemberin merkezi



K: $\overset{\triangle}{ABC}$ nin dış teğet çemberinin merkezi

(açıortayların kesim noktası)

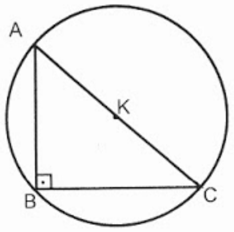
Dar açılı üçgenin çevrel çemberi



K: $\overset{\triangle}{ABC}$ nin çevrel çemberinin merkezi

(kenar orta dikmelerin kesim noktası)

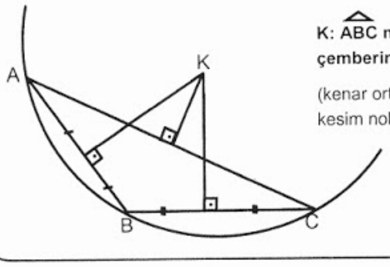
Dik açılı üçgenin çemberi



K: $\overset{\triangle}{ABC}$ nin çevrel çemberinin merkezi

(kenar orta dikmelerin kesim noktası)

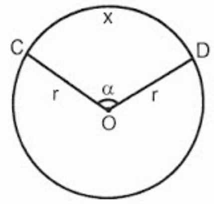
Geniş açılı üçgenin çevrel çemberi



K: $\overset{\triangle}{ABC}$ nin çevrel çemberinin merkezi

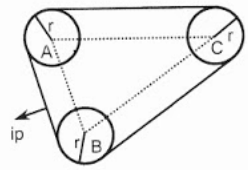
(kenar orta dikmelerin kesim noktası)

YAY UZUNLUĞU;



$$|\overset{\frown}{CxD}| = \frac{2\pi r\alpha}{360}$$

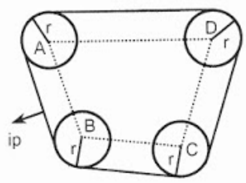
ÇEMBERLERE SARILAN İP



İpin uzunluğu

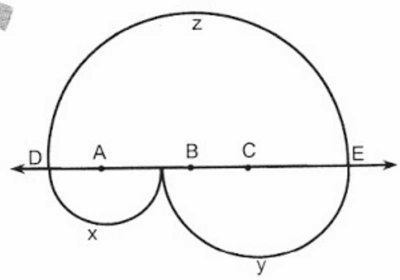
$Ç(\overset{\triangle}{ABC}) + 2\pi r$ dir

ÇEMBERLERE SARILAN İP

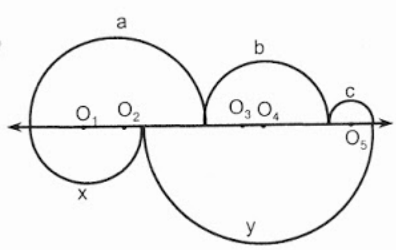


İpin uzunluğu

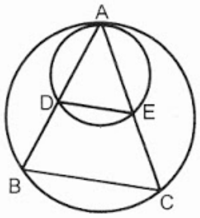
$Ç(ABCD) + 2\pi r$ dir



A, B, C merkez ise $z = x + y$ eşitliği çıkarılabilir.



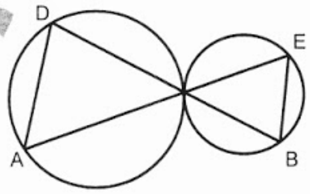
$a + b + c = x + y$ eşitliği çıkarılabilir.



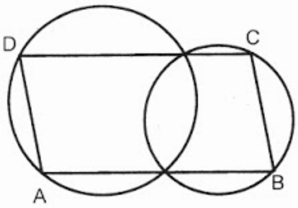
Şekle göre,
[DE] // [BC] ve

$$\frac{|AD|}{|AB|} = \frac{|AE|}{|AC|}$$

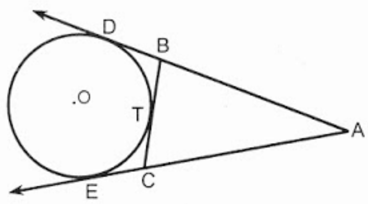
sonucuna varılabilir.



Şekle göre
[AD] // [BE]
sonucuna varılabilir.

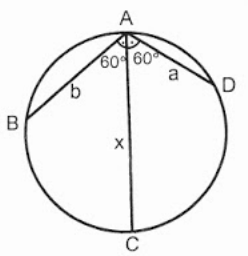


Şekle göre
[AD] // [BC]
sonucuna varılabilir.

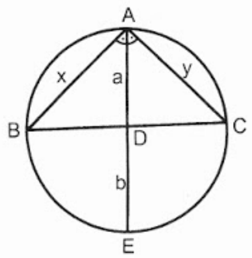


D, T ve E teğet değme noktaları ise

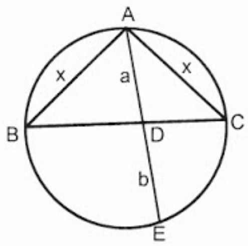
$Ç(\widehat{ABC}) = 2|AD| = 2|AE|$ eşitliği çıkarılabilir.



Şekle göre
$x = a + b$
eşitliği çıkarılabilir.

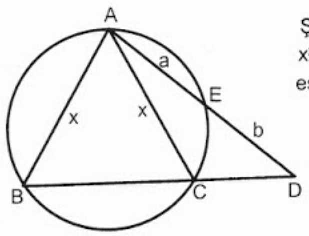


Şekle göre,
$xy = a(a + b)$
eşitliği çıkarılabilir.

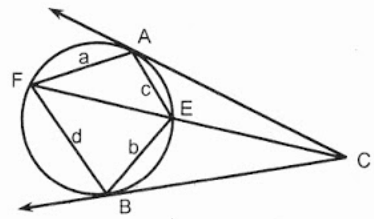


Şekle göre
$x^2 = a(a + b)$
eşitliği çıkarılabilir.

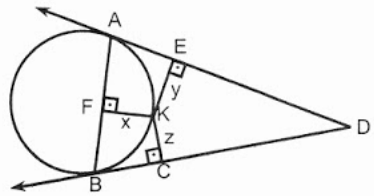
Şimdi [AE] doğru parçasını çemberin dışına doğru çekelim böylece aşağıdaki gibi bir şekil ortaya çıkar. Dolayısı ile formülde aynıdır... Ne hoş manzara :)



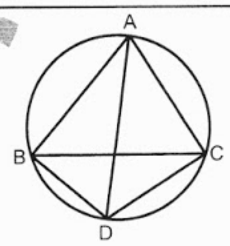
Şekle göre
$x^2 = a(a + b)$
eşitliği çıkarılabilir.



A ve B teğet değme noktaları ise $a.b = c.d$
eşitliği çıkarılabilir.



A ve B teğet değme noktaları ise $x^2 = y.z$ eşitliği çıkarılabilir.

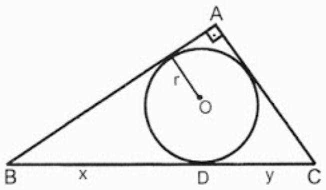


ABC eşkenar ise

|AD| = |BD| + |DC|

(ispatı: Batlamyus teo.)

Dik üçgenin iç teğet çemberinin merkezi

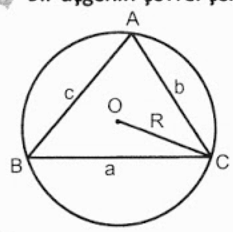


$A(\widehat{ABC}) = x.y$

$r = u - (x+y)$

($r = u$ – hipotenüs)

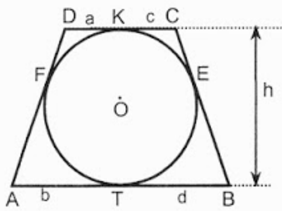
Bir üçgenin çevrel çemberi



$\text{Alan}(\widehat{ABC}) = \frac{a.b.c}{4.R}$

R: çevrel çemberin yarıçapı

Bir yamuğun iç teğet çemberi

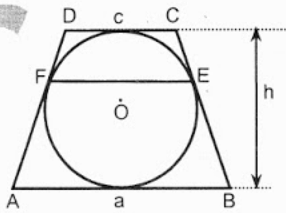


[DC] // [AB] ise

$a.b = c.d$

$r = \sqrt{a.b} = \sqrt{c.d}$

$h = 2r = 2\sqrt{a.b}$

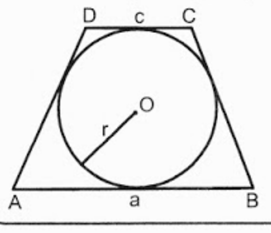


O merkezli çember ABCD ikizkenar yamuğunun teğetler dörtgeni ise

$r = \frac{\sqrt{a.c}}{2}$ $\quad |FE| = \frac{2a.c}{a+c}$

Şekil dikkatlice incelenirse: [FE] nin yamuğun köşegenlerinin kesim noktasından geçtiği görülebilir.

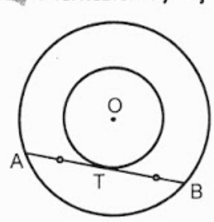
ikizkenar yamuğun iç teğet çemberi



ABCD ikizkenar yamuğu teğetler dörtgeni ise

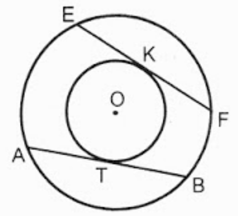
$h^2 = a.c$

Merkezleri aynı çemberler



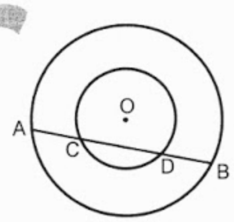
|AT| = |TB|

(O; ortak merkez)



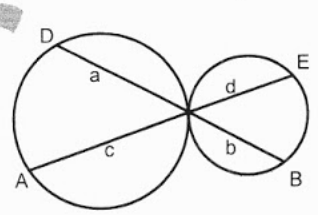
|AB| = |EF|

(O; ortak merkez)

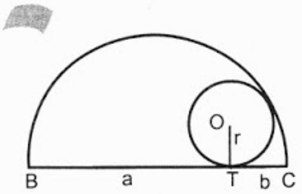


|AC| = |DB|

(O; ortak merkez)

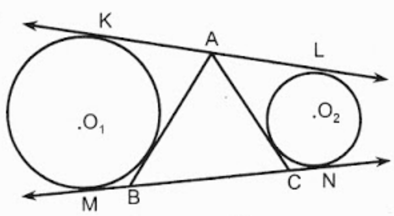


$a.d = c.b$

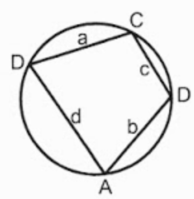


[BC] çap

$\frac{1}{r} = \frac{1}{a} + \frac{1}{b}$



$|KL| = |MN|$ ve $Ç(\widehat{ABC}) = 2|KL|$

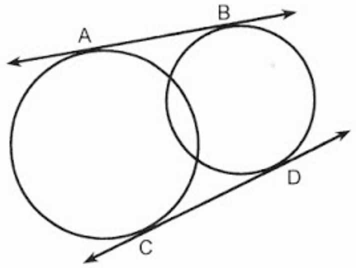


ABCD kirişler dörtgeni

$U = \frac{a+b+c+d}{2}$

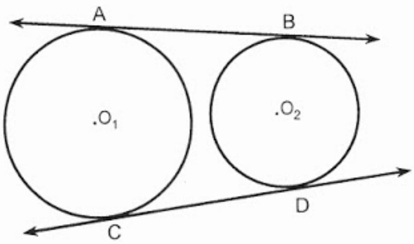
$A(ABCD) = \sqrt{(u-a).(u-b).(u-c).(u-d)}$

ORTAK DIŞ TEĞET



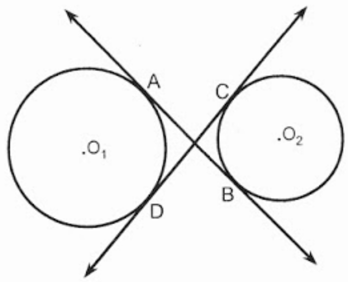
AB ve CD ortak dış teğet ise |AB| = |CD| dir.

ORTAK DIŞ TEĞET



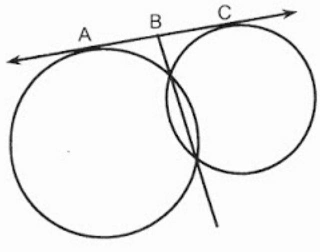
AB ve CD ortak dış teğet ise |AB| = |CD| dir.

ORTAK İÇ TEĞET

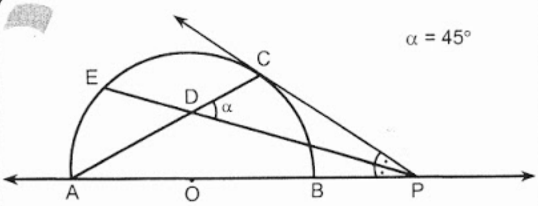


AB ve CD ortak dış teğet ise |AB| = |CD| dir.

KESİŞEN ÇEMBERLERDE ORTAK DIŞ TEĞET

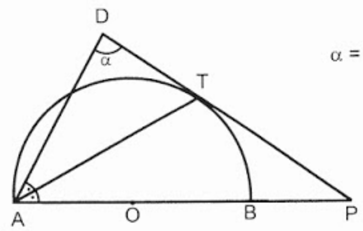


AB ortak dış teğet ise |AB| = |BC| dir.



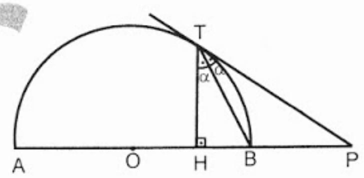
$\alpha = 45°$

C teğet değme noktası ve [PE] açıortay ise PDC açısının ölçüsü 45° dir.

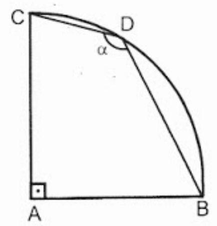


$\alpha = 90°$

T teğet değme noktası ve [AT] açıortay ise ADP açısının ölçüsü 90° dir.



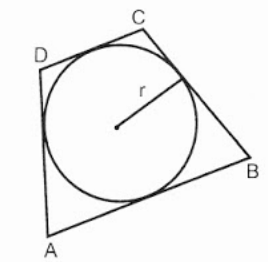
T teğet değme noktası ve [TH] ⊥ [AP] ise [TB] doğru parçası HTP açısının açıortayıdır.



$\alpha = 135°$

A noktası çeyrek çemberin merkezi ise BDC açısının ölçüsü 135° dir

TEĞETLER DÖRTGENİ

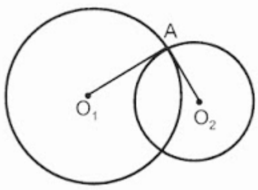


$|AB| + |CD| = |AD| + |BC|$

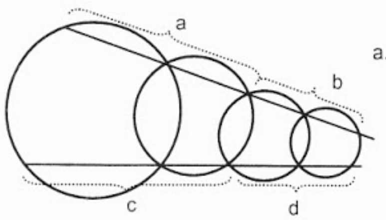
$U = \dfrac{Ç(ABCD)}{2}$

$A(ABCD) = u.r$

DİK KESİŞEN ÇEMBERLER

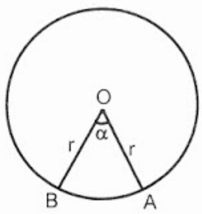


$[O_1A] \perp [AO_2] \Rightarrow$ çemberler dik kesişiyor denir.



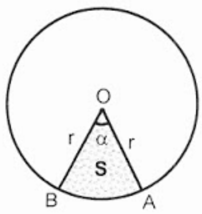
$a.d = b.c$

YAY UZUNLUĞU



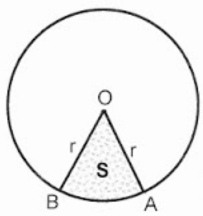
$|\widehat{AB}| = \dfrac{2\pi r\alpha}{360}$

DAİRE DİLİMİ



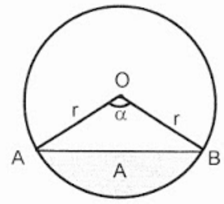
$S = \dfrac{\pi r^2\alpha}{360}$

ya da



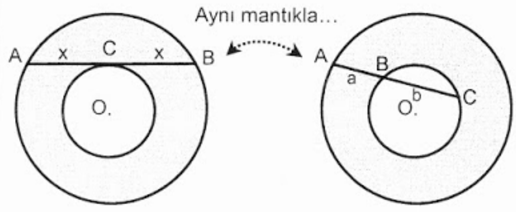
$S = \dfrac{r.|\widehat{AB}|}{2}$

DAİRE KESMESİ



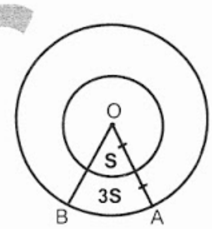
$A = \dfrac{\pi r^2\alpha}{360} - \dfrac{1}{2}r.r.\sin\alpha$

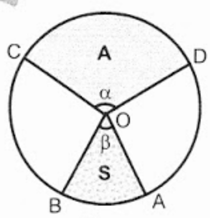
DAİRE HALKASI



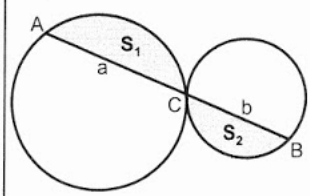
Taralı alan = $\pi.x^2$

Taralı alan = $\pi.a(a+b)$

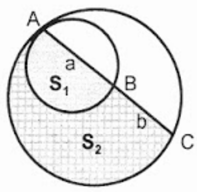




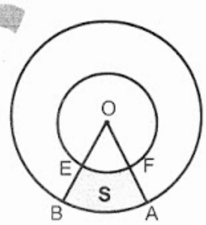
$\dfrac{A}{S} = \dfrac{\alpha}{\beta}$



$\dfrac{S_1}{S_2} = (\dfrac{a}{b})^2$

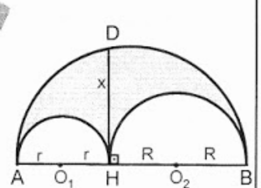


$\dfrac{S_1}{S_1 + S_2} = (\dfrac{a}{a+b})^2$

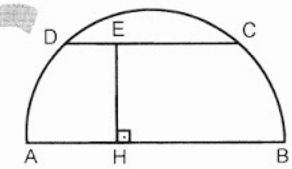


$S = \dfrac{|\widehat{EF}| + |\widehat{BA}|}{2}.|AF|$

(şekli bir yamukmuş gibi düşünebiliriz)



Taralı alan = $\pi.r.R = \dfrac{\pi x^2}{4}$

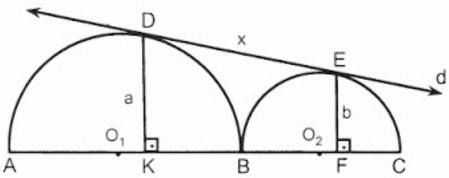


[AB] // [DC] ise

|AH| + |EC| = |HB| + |DE|

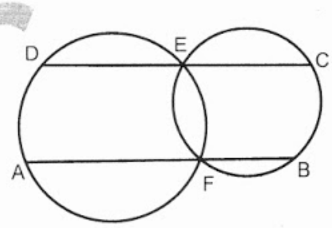
eşitliği çıkarılabilir.

ORTAK DIŞ TEĞET UZUNLUĞU



[AB] ve [BC] çap, D ve E teğet değme noktaları ise

$x = a + b$ eşitliği çıkarılabilir.

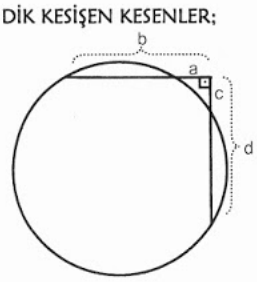


[AB] // [DC] ise

|AB| = |DC|

eşitliği çıkarılabilir.

DİK KESİŞEN KESENLER;

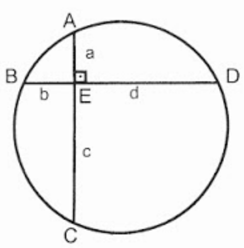


$R^2 = a^2 + b^2 + c^2 + d^2$

eşitliği çıkarılabilir.

(R: çap uzunluğu)

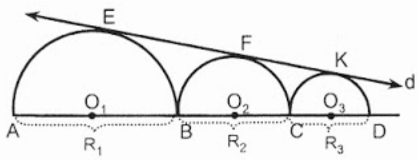
DİK KESİŞEN KİRİŞLER



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

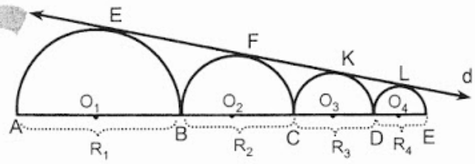
eşitliği çıkarılabilir.

(R: çap uzunluğu)



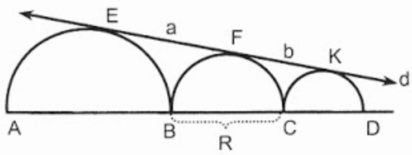
[AB], [BC], [CD] çap, E,F ve K teğet değme noktaları ise

$R_2 = \sqrt{R_1.R_3}$ eşitliği çıkarılabilir.



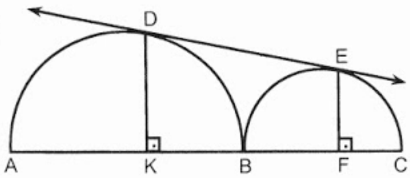
[AB], [BC], [CD], [DE] çap, E, F, K ve L teğet değme noktaları

$R_2.R_3 = R_1.R_4 = ...$ eşitliği çıkarılabilir.



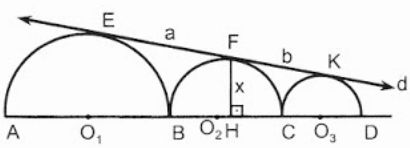
[AB], [BC], [CD] çap, E, F ve K teğet değme noktaları ise

$R = \sqrt{a.b}$ eşitliği çıkarılabilir.



[AB] ve [BC] çap, D ve E teğet değme noktaları ise

|KB| = |BF| ve $|KB|^2$ = |AK|.|FC| eşitlikleri çıkarılabilir.



[AB], [BC], [CD] çap, E, F ve K teğet değme noktaları ise

$\frac{1}{x} = \frac{1}{a} + \frac{1}{b}$ eşitliği çıkarılabilir.