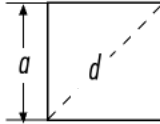
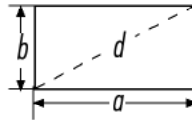


1. Alan Formülleri

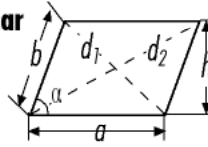
Kare $A = a^2$
 $a = \sqrt{A}$
 $d = a\sqrt{2}$



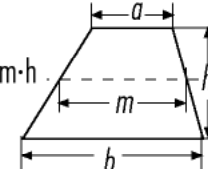
Dikdörtgen
 $A = ab$
 $d = \sqrt{a^2 + b^2}$



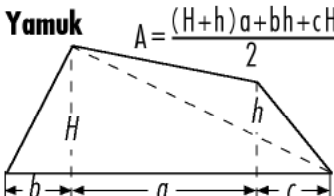
Paralelkenar
 $A = ah$
 $= ab \sin \alpha$
 $d_1 = \sqrt{(a+h \cot \alpha)^2 + h^2}$ $d_2 = \sqrt{(a-h \cot \alpha)^2 + h^2}$



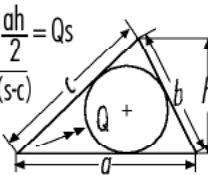
Yamuk
 $A = \frac{a+b}{2} h = m \cdot h$
 $m = \frac{a+b}{2}$



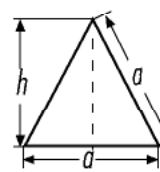
Yamuk $A = \frac{(H+h)a + bh + cH}{2}$



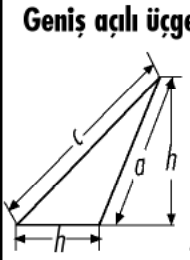
Üçgen $A = \frac{ah}{2} = Qs$
 $= \sqrt{s(s-a)(s-b)(s-c)}$
 $s = \frac{a+b+c}{2}$



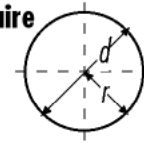
Eşkenar Üçgen
 $A = \frac{a^2 \sqrt{3}}{4}$
 $h = \frac{a}{2} \sqrt{3}$



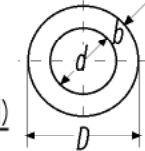
Geniş açılı üçgen $A = \frac{bh}{2}$
 $= \frac{b}{2} \sqrt{a^2 - \left(\frac{c^2 - a^2 - b^2}{2b}\right)^2}$
 Eğer $s = \frac{1}{2}(a+b+c)$
 $A = \sqrt{s(s-a)(s-b)(s-c)}$



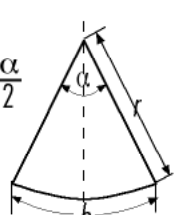
Daire $A = \frac{d^2 \pi}{4} = r^2 \pi$
 $\approx 0.785 d^2$
 $U = 2r\pi = d\pi$



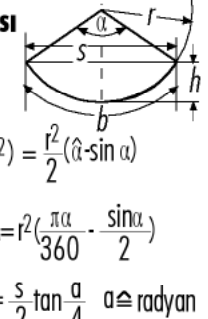
Daire halkası
 $A = \frac{\pi}{4} (D^2 - d^2)$
 $= (d+b)b\pi$ $b = \frac{(D-d)}{2}$



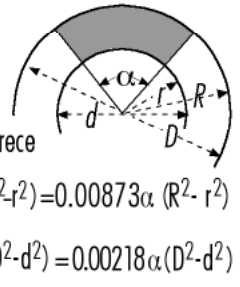
Daire dilimi
 $A = \frac{r^2 \pi \alpha^\circ}{360} = \frac{br}{2} = r^2 \frac{\alpha}{2}$
 $b = \frac{r \pi \alpha^\circ}{180^\circ}$ $\alpha = \frac{\alpha^\circ \pi}{180^\circ}$
 $(\cong \text{radyan})$



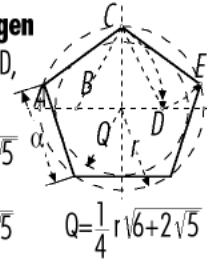
Daire Parçası
 $S = 2r \sin \frac{\alpha}{2}$
 $A = \frac{h}{6s} (3h^2 + 4s^2) = \frac{r^2}{2} (\hat{\alpha} - \sin \alpha)$
 $r = \frac{h}{2} + \frac{s^2}{8h}$ $A = r^2 \left(\frac{\pi \alpha}{360} - \frac{\sin \alpha}{2} \right)$
 $h = r(1 - \cos \frac{\alpha}{2}) = \frac{s}{2} \tan \frac{\alpha}{4}$ $\alpha \cong \text{radyan}$



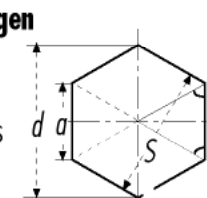
Circular ring sector
 $\alpha = \alpha^\circ, \text{ derece}$
 $A = \frac{\alpha \pi}{360} (R^2 - r^2) = 0.00873 \alpha (R^2 - r^2)$
 $= \frac{\alpha \pi}{4 \times 360} (D^2 - d^2) = 0.00218 \alpha (D^2 - d^2)$



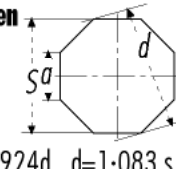
Düzgün beşgen
 $AB=05r, BC=BD, CD=CE$
 $A = \frac{5}{8} r^2 \sqrt{10+2\sqrt{5}}$
 $a = \frac{1}{2} r \sqrt{10+2\sqrt{5}}$ $Q = \frac{1}{4} r \sqrt{6+2\sqrt{5}}$



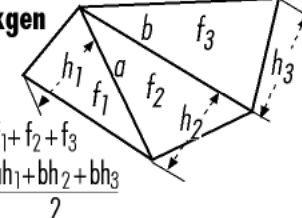
Düzgün altıgen
 $A = \frac{3a^2 \sqrt{3}}{2}$
 $d = 2a = 1.155 s$
 $s = 0.866 d$



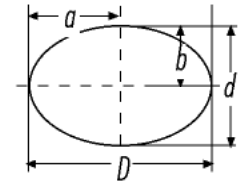
Düzgün sekizgen
 $A = 2as = 0.83 s^2$
 $= 2s \sqrt{a^2 - s^2}$
 $a = 0.415 s$ $s = 0.924 d$ $d = 1.083 s$



Çokgen
 $A = f_1 + f_2 + f_3$
 $= \frac{ah_1 + bh_2 + bh_3}{2}$



Elips
 $A = \frac{Dd\pi}{4} = ab\pi$
 $U = \frac{D+d}{2} \pi$
 $= \pi(a+b) \left[1 + \frac{1}{4} \lambda^2 + \frac{1}{64} \lambda^4 + \frac{1}{256} \lambda^6 + \frac{25}{16384} \lambda^8 + \dots \right]$, burada $\lambda = \frac{a-b}{a+b}$



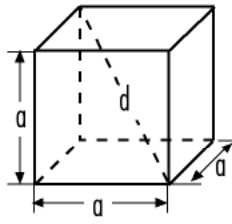
2. Hacim Formülleri

Küp

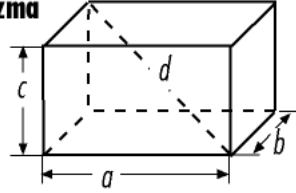
$$V = a^3$$

$$A_0 = 6a^2$$

$$d = a\sqrt{3}$$



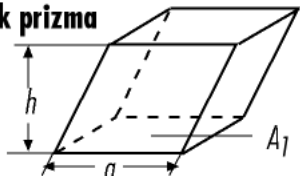
Prizma



$$V = abc \quad A_0 = 2(ab + ac + bc)$$

$$d = \sqrt{a^2 + b^2 + c^2}$$

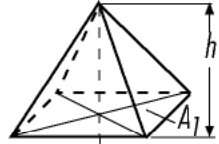
Eğik prizma



$$V = A_1 h \quad (\text{cavalieri prensibi})$$

Piramit

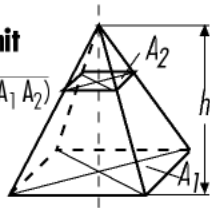
$$V = \frac{A_1 h}{3}$$



Kesik Piramit

$$V = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

$$\approx h \frac{A_1 + A_2}{2}$$

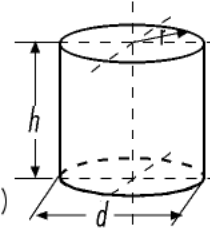


Silindir

$$V = \frac{d^2 \pi h}{4}$$

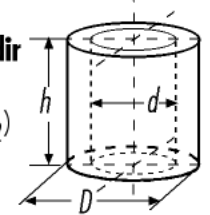
$$A_m = 2r\pi h$$

$$A_0 = 2r\pi(r+h)$$



İçi boş silindir

$$V = \frac{h\pi}{4} (D_2^2 - d_2^2)$$



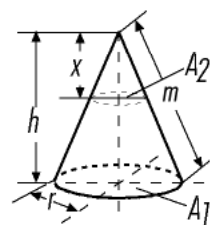
Koni

$$V = \frac{r^2 \pi h}{3}$$

$$A_m = r\pi m$$

$$A_0 = r\pi(r+m)$$

$$m = \sqrt{h^2 + r^2} \quad A_2 : A_1 = x^2 : h^2$$



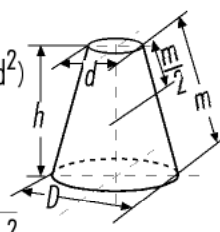
Kesik koni

$$V = \frac{\pi h}{12} (D^2 + Dd + d^2)$$

$$A_m = \frac{\pi m}{2} (D+d)$$

$$= 2\pi r h$$

$$m = \sqrt{\left(\frac{D-d}{2}\right)^2 + h^2}$$

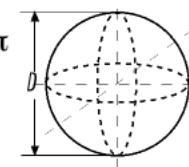


Küre

$$V = \frac{4}{3} r^3 \pi = \frac{1}{6} d^3 \pi$$

$$= 4.189 r^3$$

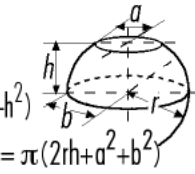
$$A_0 = 4\pi r^2 = \pi d^2$$



Kesik küre

$$V = \frac{\pi h}{6} (3a^2 + 3b^2 + h^2)$$

$$A_m = 2r\pi h \quad A = \pi(2rh + a^2 + b^2)$$

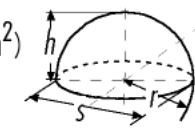


Küre parçası

$$V = \frac{\pi h}{6} \left(\frac{3}{4} s^2 + h^2 \right)$$

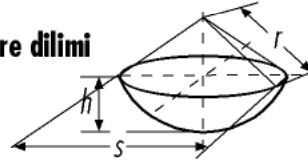
$$= \pi h^2 \left(r - \frac{h}{3} \right)$$

$$A_m = 2\pi r h = \frac{\pi}{4} (s^2 + 4h^2)$$



Küre dilimi

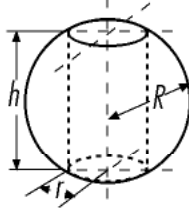
$$V = \frac{2}{3} h r^2 \pi \quad A_0 = \frac{\pi r}{2} (4h + s)$$



Silindirik delikli küre

$$V = \frac{\pi h^3}{6}$$

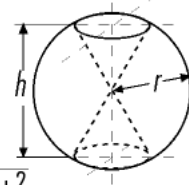
$$A_0 = 2\pi h (R+r)$$



Konik delikli küre

$$V = \frac{2r^2 \pi h}{3}$$

$$A_0 = 2r\pi \left(h + \sqrt{r^2 + \frac{h^2}{4}} \right)$$

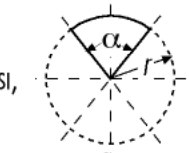


Küre parçası

$$\alpha = \text{merkez açısı, derece}$$

$$V = \frac{\alpha}{360} \frac{4\pi r^2}{3} = 0.0116 \alpha r^2$$

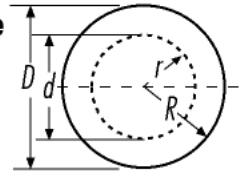
$$A = \frac{\alpha}{360} \times 4\pi r^2 = 0.0349 \alpha r^2$$



Boş küre

$$V = \frac{4\pi}{3} (R^3 + r^3) = 4.1888 (R^3 + r^3)$$

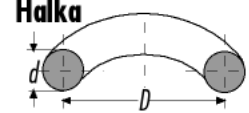
$$= \frac{\pi}{6} (D^3 + d^3) = 0.5236 (D^3 + d^3)$$



Halka

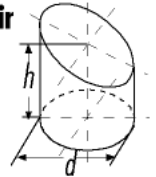
$$V = \frac{D\pi^2 d^2}{4}$$

$$A_0 = Dd\pi^2$$



Eğik kesik silindir

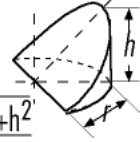
$$V = \frac{d^2 \pi h}{4}$$



At tırnağı

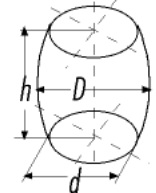
$$V = \frac{2}{3} r^2 h \quad A_m = 2rh$$

$$A_0 = A_m + \frac{r^2 \pi}{2} + \frac{r\pi \sqrt{r^2 + h^2}}{2}$$



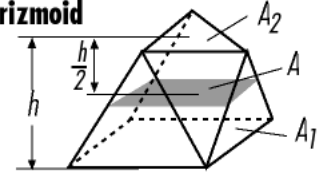
Fıçı

$$V = \frac{h\pi}{12} (2D^2 + d^2)$$



Prizmoid

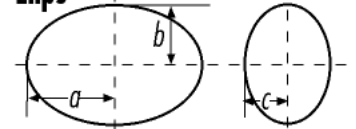
$$V = \frac{h}{6} (A_1 + A_2 + 4A)$$



Elips

$$V = \frac{4\pi}{3} abc = 4.1888 abc$$

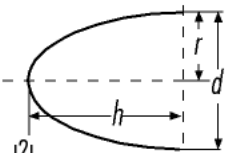
$$\text{Eğer } b = c \text{ ise, } V = 4.1888 ab^2$$



Parabol

$$V = \frac{1}{2} \pi r^2 h = 0.3927 d^2 h$$

$$A = \frac{2\pi}{2p} \left[\sqrt{\left(\frac{d^2}{4} + p^2\right)^2 - p^3} \right] \quad p = \frac{d^2}{3h}$$



Konduksiyon katsayısı : $\text{kcal/mh}^{\circ}\text{C} = 1.787.10 \times \frac{\text{BTU}}{(\text{in}) (\text{hr}) (^{\circ}\text{F})}$

Isı iletim katsayısı : $\text{kcal/m}^2\text{h}^{\circ}\text{C} = 4.886 \times \frac{\text{BTU}}{(\text{sqft}) (\text{hr}) (^{\circ}\text{F})}$

Isı geçirgenlik katsayısı : $\text{kcal/m}^2\text{h} = 1.405.10^6 \times \frac{\text{BTU}}{(\text{sqin}) (\text{sec})}$

$\text{kcal/m}^2\text{h} = 9.765.10^3 \times \frac{\text{BTU}}{(\text{sqft}) (\text{sec})}$

Açıklayıcı terimler :

square	(s4)	=	kare
hours	(hrs)	=	saat
sec		=	açı
revolution		=	devir
minute	(min)	=	dakika
second	(sec)	=	saniye
mercury		=	civa
water		=	su
cubic	(cu)	=	küb

4. Trigonometri formülleri

$\sin^2 A + \cos^2 A = 1$	$\tan A = \frac{\sin A}{\cos A} = \frac{1}{\cot A}$	$\sin^2 - A \sin^2 B = \cos^2 B - \cos^2 A = \sin (A + B) \sin (A - B)$
$\cot A = \frac{\cos A}{\sin A} = \frac{1}{\tan A}$	$\sec A = \frac{1}{\cos A}$	$\cos^2 A \sin^2 B = \cos^2 B - \sin^2 A = \cos (A + B) \cos (A - B)$
$\csc A = \frac{1}{\sin A}$	$\operatorname{cosec} A = \frac{1}{\sin A}$	$\sin A \sin B = \frac{1}{2} \cos (A - B) - \frac{1}{2} \cos (A + B)$
$\sin A = \sqrt{1 - \cos^2 A} = \frac{\tan A}{\sqrt{1 + \tan^2 A}} = \frac{1}{\sqrt{1 + \cot^2 A}}$		$\cos A \cos B = \frac{1}{2} \cos (A - B) + \frac{1}{2} \cos (A + B)$
$\cos A = \sqrt{1 - \sin^2 A} = \frac{1}{\sqrt{1 + \tan^2 A}} = \frac{\cot A}{\sqrt{1 + \cot^2 A}}$		$\sin A \cos B = \frac{1}{2} \sin (A + B) + \frac{1}{2} \sin (A - B)$
$\sin (A + B) = \sin A \cos B + \cos A \sin B$		$\tan A \tan B = \frac{\tan A + \tan B}{\cot A + \cot B} \cot A \cot B = \frac{\cot A + \cot B}{\tan A + \tan B}$
$\sin (A - B) = \sin A \cos B - \cos A \sin B$		$\sin A = 2 \sin \frac{1}{2} A \cos \frac{1}{2} A$
$\cos (A + B) = \cos A \cos B - \sin A \sin B$		$\sin 2 A = 2 \sin A \cos A$
$\cos (A - B) = \cos A \cos B + \sin A \sin B$		$\cos 2 A = \cos^2 A - \sin^2 A = 1 - 2 \sin^2 A = 2 \cos^2 A - 1$
$\tan (A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$	$\tan (A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$	$\tan 2 A = \frac{2 \tan A}{1 - \tan^2 A} = \frac{2}{\cot A - \tan A}$
$\cot (A + B) = \frac{\cot A \cot B - 1}{\cot B + \cot A}$	$\cot (A - B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$	$\cot 2 A = \frac{\cot^2 A - 1}{2 \cot A} = \frac{\cot A - \tan A}{2}$
$\tan A + \tan B = \frac{\sin (A + B)}{\cos A \cos B}$	$\tan A - \tan B = \frac{\sin (A - B)}{\cos A \cos B}$	$\sin A = \frac{2 \tan \frac{1}{2} A}{1 + \tan^2 \frac{1}{2} A}$
$\cot A + \cot B = \frac{\sin (B + A)}{\sin A \sin B}$	$\cot A - \cot B = \frac{\sin (B - A)}{\sin A \sin B}$	$\cos A = \frac{1 - \tan^2 \frac{1}{2} A}{1 + \tan^2 \frac{1}{2} A}$
		$2 \sin^2 A = 1 - \cos 2 A$
		$2 \cos^2 A = 1 + \cos 2 A$

5. Üst ve köklerle ilgili önemli formüller

Önemli üs kaideleri

Genel Örnekler	Sayısal örnekler
$p a^n \pm q a^n = (p \pm q) a^n$	$3a^4 + 4a^4 = 7a^4$
$a^m a^n = a^{m+n}$	$a^8 a^4 = a^{12}$
$\frac{a^m}{a^n} = a^{m-n}$	$\frac{a^8}{a^2} = a^{8-2} = a^6$
$(a^m)^n = (a^n)^m = a^{mn}$	$(a^3)^2 = (a^2)^3 = a^{2 \cdot 3} = a^6$
$a^{-n} = \frac{1}{a^n}$	$a^{-4} = \frac{1}{a^4}$
$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$	$\frac{a^3}{b^3} = \left(\frac{a}{b}\right)^3$

Önemli kök kaideleri

Genel Örnekler	Sayısal örnekler
$p \sqrt[n]{a} \pm p \sqrt[n]{a} = (p \pm q) \sqrt[n]{a}$	$4 \sqrt[3]{x} \pm 7 \sqrt[3]{x} = 11 \sqrt[3]{x}$
$\sqrt[n]{ab} = \sqrt[n]{a} \sqrt[n]{b}$	$\sqrt[4]{16 \times 81} = \sqrt[4]{16} \sqrt[4]{81}$
$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}} = \left(\frac{a}{b}\right)^{\frac{1}{n}}$	$\frac{\sqrt{8}}{\sqrt{2}} = \sqrt{4} = 2$
$n \sqrt[n]{a^m} = \sqrt[n]{a^{mn}}$	$6 \sqrt[4]{8} = \sqrt[3]{4^4}$
$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m = a^{\frac{m}{n}}$ (*)	$\sqrt[4]{a^3} = \left(\sqrt[4]{a}\right)^3 = a^{\frac{3}{4}}$
$\sqrt{-a} = \sqrt[n]{a}$	$\sqrt{-9} = \sqrt[3]{9} = 3i$

*) Bazı özel hesaplamalara uygulanamaz. Örneğin; $\sqrt{(-2)^2} = +2$ veya; $\sqrt{(-2)^2} = -2$