

Formule de calcul prescurtat

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$a^2 - b^2 = (a+b)(a-b)$$
$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$$
$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$
$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$
$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$
$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Proprietățile puterilor

$$a^m \cdot a^n = a^{m+n}$$
$$\frac{a^m}{a^n} = a^{m-n}$$
$$(a^m)^n = a^{m \cdot n}$$
$$(a \cdot b)^n = a^n \cdot b^n$$
$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$
$$a^0 = 1$$
$$0^n = 0$$
$$1^n = 1$$

Proprietățile radicalilor

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$
$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$
$$\sqrt{x^2} = |x|$$
$$(\sqrt{y})^2 = y$$
$$a \geq 0, b > 0, y \geq 0$$

Modulul unui număr real

Definiție:

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

Proprietăți:

$$|x| \geq 0, \forall x \in \mathbb{R}$$

$$|x| = 0 \Leftrightarrow x = 0$$

$$|a \cdot b| = |a| \cdot |b|$$

$$\left|\frac{a}{b}\right| = \frac{|a|}{|b|}, b \neq 0$$

$$|a+b| \leq |a| + |b|$$

Mulțimi de numere:

Mulțimea numerelor naturale $\mathbb{N} = \{0, 1, 2, 3, \dots\}$

Mulțimea numerelor întregi $\mathbb{Z} = \{0, \pm 1, \pm 2, \pm 3, \dots\}$

Mulțimea numerelor raționale $\mathbb{Q} = \left\{ \frac{m}{n} / m, n \in \mathbb{Z}, n \neq 0 \right\}$

Mulțimea numerelor reale \mathbb{R}

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$$

Media aritmetică

$$m_a = \frac{a+b}{2}$$

$$m_a = \frac{a+b+c}{3}$$

$$m_a = \frac{a_1 + a_2 + \dots + a_n}{n}$$

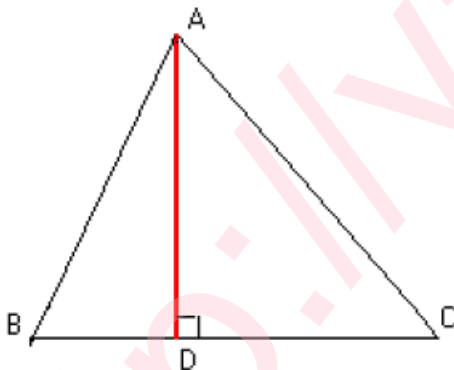
Media geometrică

$$m_g = \sqrt{a \cdot b}$$

$$a \geq 0$$

$$b \geq 0$$

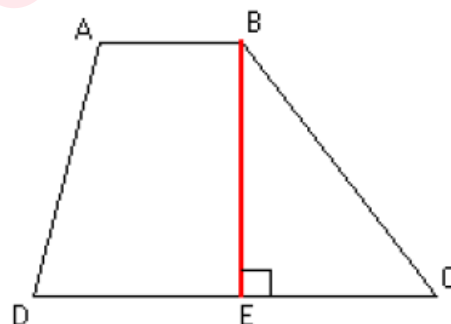
Figuri geometrice plane remarcabile



Triunghiul oarecare

$$A_{\triangle ABC} = \frac{BC \cdot AD}{2} = \frac{AB \cdot AC \cdot \sin A}{2}$$

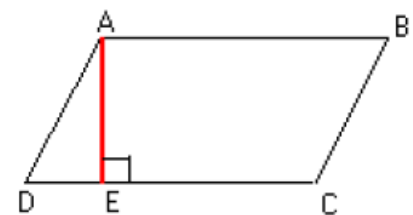
$$P_{\triangle ABC} = AB + BC + CA$$



Trapezul

$$A_{ABCD} = \frac{(AB + CD) \cdot BE}{2}$$

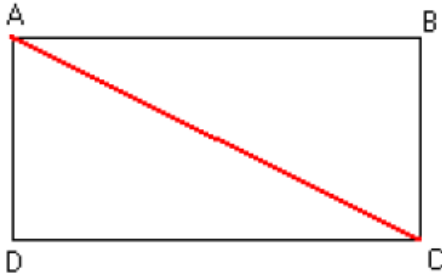
$$P_{ABCD} = AB + BC + CD + DA$$



Paralelogramul

$$A_{ABCD} = CD \cdot AE$$

$$P_{ABCD} = 2(AB + BC)$$

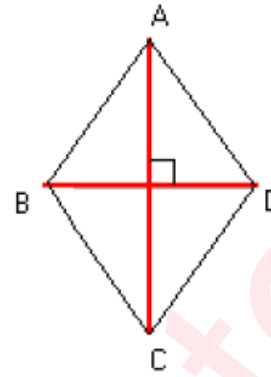


Dreptunghiul

$$A_{ABCD} = AB \cdot BC$$

$$AC^2 = AB^2 + BC^2$$

$$P_{ABCD} = 2(AB + BC)$$



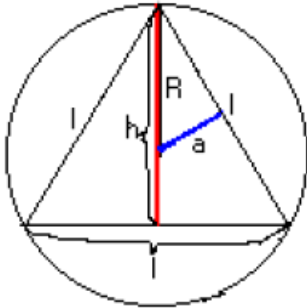
Rombul

$$A_{ABCD} = \frac{AC \cdot BD}{2}$$

$$P_{ABCD} = 4 \cdot AB$$

Poligoane regulate

l =latura poligonului
 a =apotema poligonului
 A =aria
 P =perimetrul



Triunghiul echilateral

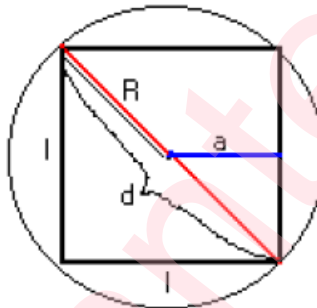
$$P = 3 \cdot l$$

$$A = \frac{l^2 \sqrt{3}}{4}$$

$$a = \frac{l \sqrt{3}}{6}$$

$$l = R \sqrt{3}$$

$$h = \frac{l \sqrt{3}}{2} = \frac{3R}{2}$$



Pătratul

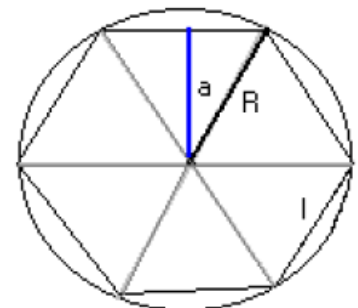
$$P = 4 \cdot l$$

$$A = l^2$$

$$a = \frac{l}{2}$$

$$l = R \sqrt{2}$$

$$d = l \sqrt{2} = 2R$$



Hexagonul regulat

$$P = 6 \cdot l$$

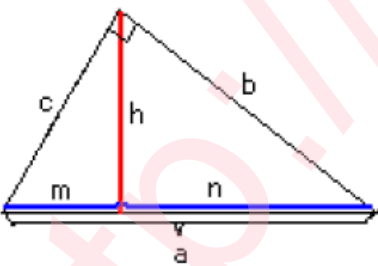
$$A = \frac{3l^2 \sqrt{3}}{2}$$

$$a = \frac{l \sqrt{3}}{2}$$

$$l = R$$

$$d = 2l = 2R$$

Triunghiul dreptunghic



Teorema lui Pitagora

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

$$c^2 = h^2 + m^2$$

$$b^2 = h^2 + n^2$$

Teorema catetei

$$b^2 = a \cdot n$$

$$c^2 = a \cdot m$$

Teorema înălțimii

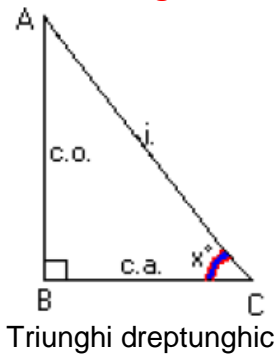
$$h^2 = m \cdot n$$

$$h = \frac{b \cdot c}{a}$$

Aria triunghiului dreptunghic

$$A = \frac{b \cdot c}{2} = \frac{a \cdot h}{2}$$

Funcții trigonometrice



Funcția	30°	45°	60°
sin	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tg	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$
ctg	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$

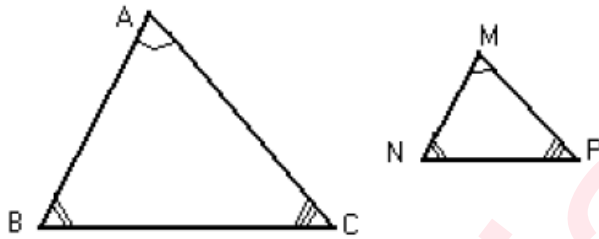
$$\sin x^\circ = \frac{\text{cateta - opusa}}{\text{ipotenuza}} = \frac{AB}{AC}$$

$$\cos x^\circ = \frac{\text{cateta - alaturata}}{\text{ipotenuza}} = \frac{BC}{AC}$$

$$\text{tg} x^\circ = \frac{\text{cateta - opusa}}{\text{cateta - alaturata}} = \frac{AB}{BC}$$

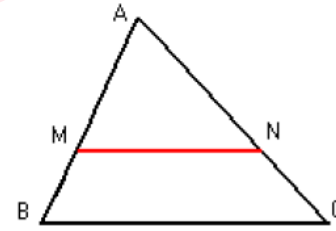
$$\text{ctg} x^\circ = \frac{\text{cateta - alaturata}}{\text{cateta - opusa}} = \frac{BC}{AB}$$

Triunghiuri asemenea



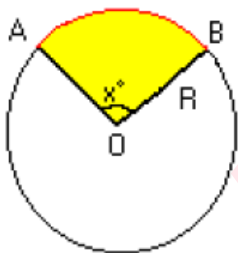
$$\Delta ABC \text{ asemenea } \Delta MNP \Rightarrow \frac{AB}{MN} = \frac{BC}{NP} = \frac{AC}{MP}$$

Teorema lui Thales



$$\begin{aligned} & BC \parallel MN \\ \Rightarrow & \frac{AM}{MB} = \frac{AN}{NC} \end{aligned}$$

Cercul



Lungimea cercului

$$L_c = 2\pi R$$

$$L_{AB} = \frac{\pi R x^\circ}{180^\circ}$$

Aria cercului

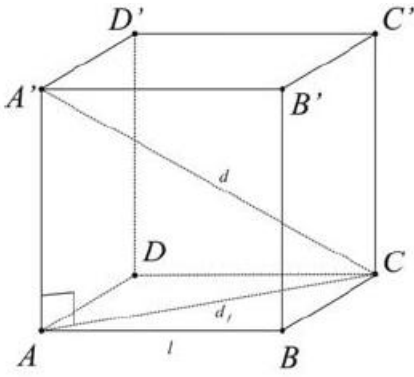
$$A_c = \pi R^2$$

$$A_{OAB} = \frac{\pi R^2 x^\circ}{360^\circ}$$

Corpuri geometrice-formule

Poliedre

Cubul



$$A_l = 4l^2$$

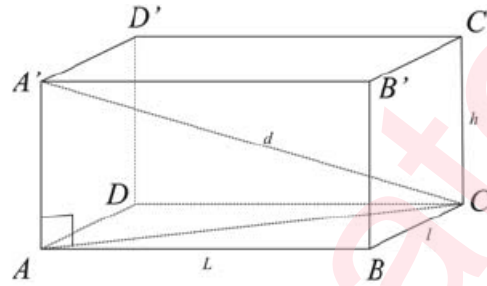
$$A_t = 6l^2$$

$$V = l^3$$

$$d_1 = l\sqrt{2}$$

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

Paralelipipedul dreptunghic



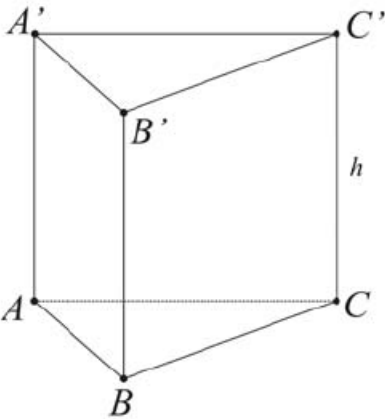
$$A_l = 2(L \cdot h + l \cdot h)$$

$$A_t = 2(L \cdot l + L \cdot h + l \cdot h)$$

$$V = L \cdot l \cdot h$$

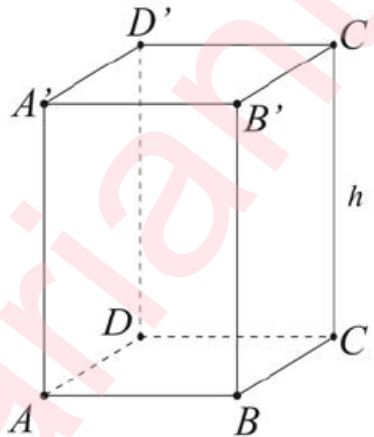
$$d = \sqrt{L^2 + l^2 + h^2}$$

Triunghiulară

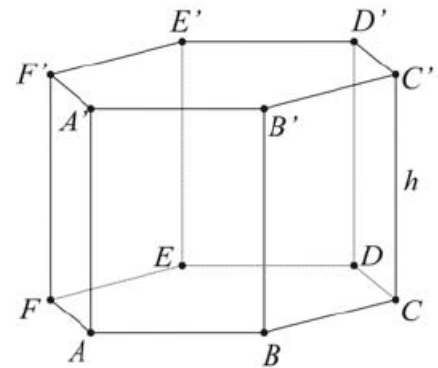


Prisma regulată

Patrulateră



Hexagonală



$$A_l = P_b \cdot h$$

$$A_t = A_l + 2 \cdot A_b \quad (\text{formule valabile pt.cele trei corpuri de mai sus})$$

$$V = A_b \cdot h$$

P_b =perimetrul bazei

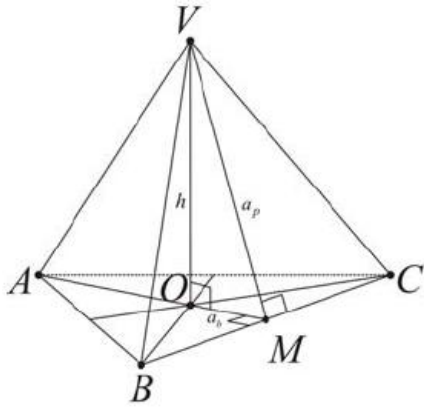
A_l =aria laterală

A_t = aria totală

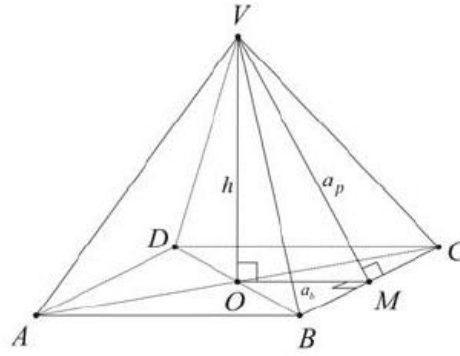
A_b = aria bazei

h=inălțimea prisme

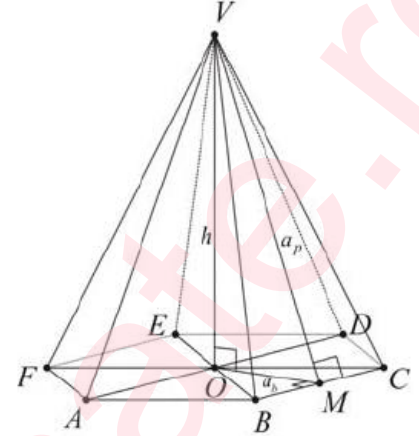
Triunghiulară



Piramida regulată
Patrulateră



Hexagonală



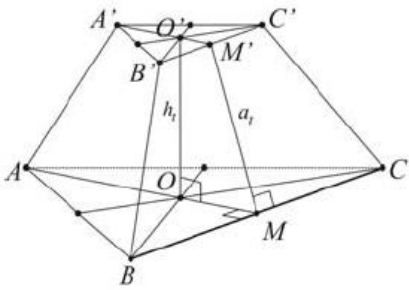
$$A_l = \frac{P_b \cdot a_p}{2}$$

$$A_t = A_l + A_b$$

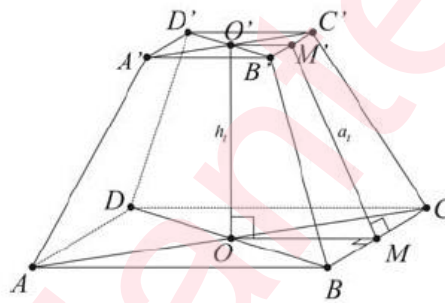
$$V = \frac{A_b \cdot h}{3}$$

(a_p = apotema piramidei)

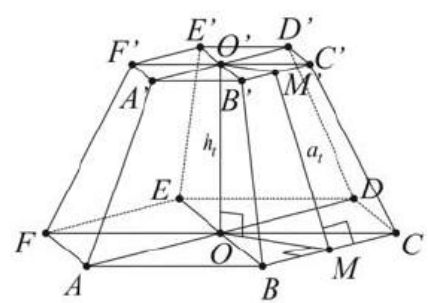
Triunghiulară



Trunchiul de piramidă regulată
Patrulateră



Hexagonală



$$A_l = \frac{(P_B + P_b) \cdot a_t}{2}$$

$$A_t = A_l + A_B + A_b$$

$$V = \frac{h_t}{3} (A_B + A_b + \sqrt{A_B \cdot A_b})$$

P_B =perimetrul bazei mari

P_b =perimetrul bazei mici

a_t =apotema trunchiului

A_l =aria laterală

A_t = aria totală

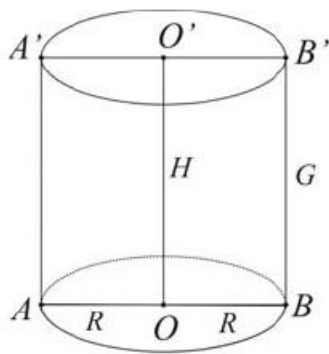
A_B = aria bazei mari

A_b = aria bazei mici

h_t =înălțimea trunchiului

Corpuri rotunde

Cilindrul

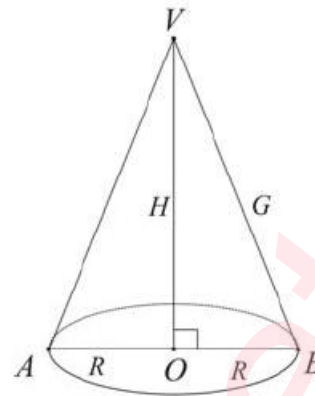


$$A_l = 2\pi RG$$

$$A_t = 2\pi R(G + R)$$

$$V = \pi R^2 H$$

Conul

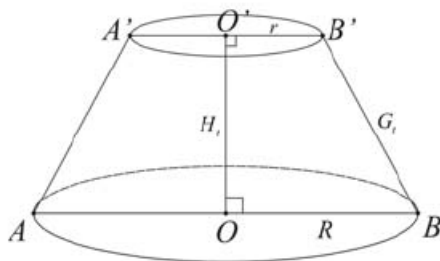


$$A_l = \pi RG$$

$$A_t = \pi R(G + R)$$

$$V = \frac{\pi R^2 H}{3}$$

Trunchiul de con

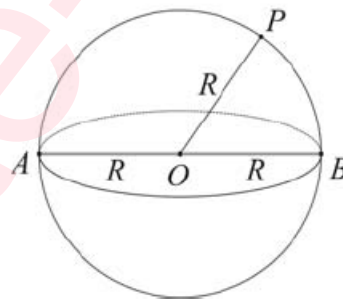


$$A_l = \pi G_t (R + r)$$

$$A_t = \pi G_t (R + r) + \pi R^2 + \pi r^2$$

$$V = \frac{\pi H_t}{3} (R^2 + r^2 + R \cdot r)$$

Sfera



$$A = 4\pi R^2$$

$$V = \frac{4\pi R^3}{3}$$