Formulas

(pieļaujamām burtu vērtībām)

Saīsinātās reizināšanas formulas

$$(a\pm b)^3 = a^3 \pm 3a^2b + 3ab^2 \pm b^3$$

$$a^3 \pm b^3 = (a\pm b)(a^2 \mp ab + b^2)$$

Kvadrāttrinoms

$$ax^2 + bx + c = a(x - x_1)(x - x_2)$$

Kvadrātvienādojums

$$ax^2 + bx + c = 0 \quad (a \neq 0)$$

$$\begin{cases} x_1 + x_2 = -\dfrac{b}{a} \\ x_1 \cdot x_2 = \dfrac{c}{a} \end{cases}$$

Modulis

$$|a| = \begin{cases} a, \ ja \ a \geq 0 \\ -a, \ ja \ a < 0 \end{cases}$$

$$|a| \geq 0$$

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

Aritmētiskā progresija

$$a_n = a_1 + (n-1)d$$

$$S_n = \frac{(a_1 + a_n)n}{2}$$

$$a_k = \frac{a_{k+1} + a_{k-1}}{2}$$

Ģeometriskā progresija

$$b_n = b_1 \cdot q^{n-1}$$

$$S_n = \frac{b_1(q^n - 1)}{q - 1}$$

$$b_k^2 = b_{k-1} \cdot b_{k+1}$$

Bezgalīgi dilstoša ģeometriskā progresija

$$|q| < 1$$

$$S = \frac{b_1}{1 - q}$$

Pakāpju īpašības

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

$$a^m \cdot a^n = a^{m+n}$$

$$a^m : a^n = a^{m-n}$$

$$a^m \cdot b^m = (a \cdot b)^m$$

$$(a^m)^n = a^{m \cdot n}$$

Sakņu īpašības

$$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{a \cdot b}$$

$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$$

$$\sqrt[n \cdot m]{a^{k \cdot m}} = \sqrt[n]{a^k}$$

$$\sqrt[n]{\sqrt[m]{a}} = \sqrt[n \cdot m]{a}$$

$$\sqrt[n]{a} \cdot \sqrt[k]{b} = \sqrt[n \cdot k]{a^k \cdot b^n}$$

$$\sqrt{a^2} = |a|$$

Logaritmu īpašības

$$a^{\log_a b} = b$$

$$\log_a(xy) = \log_a x + \log_a y$$

$$\log_a \frac{x}{y} = \log_a x - \log_a y$$

$$\log_a x^k = k \cdot \log_a x$$

$$\log_a b = \frac{\log_c b}{\log_c a}$$

$$\log_{a^k} x = \frac{1}{k} \log_a x$$

Kombinatorika

$$P_n = n!$$

$$A_n^k = \frac{n!}{(n-k)!} \qquad C_n^k = \frac{n!}{k!(n-k)!}$$

$$C_n^m = C_n^{n-m} \qquad C_n^0 + C_n^1 + C_n^2 + \ldots + C_n^{n-1} + C_n^n = 2^n$$

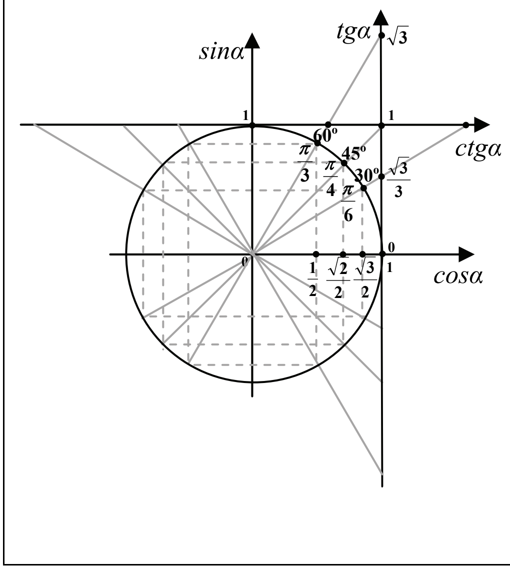
Varbūtību teorija

$P(A) = \dfrac{k}{n}$, kur k – labvēlīgo notikumu skaits, n – visu vienādi iespējamo notikumu skaits

$P(A \cup B) = P(A) + P(B)$,
kur A,B – nesavienojami notikumi

$P(A \cap B) = P(A) \cdot P(B)$,
kur A,B – neatkarīgi notikumi

Trigonometrija



$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$tg\alpha = \frac{\sin\alpha}{\cos\alpha} \qquad ctg\alpha = \frac{\cos\alpha}{\sin\alpha}$$

$$1 + tg^2\alpha = \frac{1}{\cos^2\alpha}$$

$$1 + ctg^2\alpha = \frac{1}{\sin^2\alpha}$$

$$tg\alpha \cdot ctg\alpha = 1$$

$$\sin 2\alpha = 2\sin\alpha \cdot \cos\alpha$$

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

$$tg2\alpha = \frac{2tg\alpha}{1 - tg^2\alpha}$$

$$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$

$$tg(\alpha \pm \beta) = \frac{tg\alpha \pm tg\beta}{1 \mp tg\alpha \cdot tg\beta}$$

$$ctg(\alpha \pm \beta) = \frac{ctg\alpha \cdot ctg\beta \mp 1}{ctg\beta \pm ctg\alpha}$$

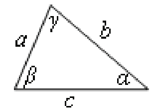
$$\sin\alpha \pm \sin\beta = 2\sin\frac{\alpha \pm \beta}{2}\cos\frac{\alpha \mp \beta}{2}$$

$$\cos\alpha + \cos\beta = 2\cos\frac{\alpha + \beta}{2}\cos\frac{\alpha - \beta}{2}$$

$$\cos\alpha - \cos\beta = -2\sin\frac{\alpha + \beta}{2}\sin\frac{\alpha - \beta}{2}$$

Trijstūris

a, b, c – malas, α, β, γ – leņķi, *r* – ievilktās riņķa līnijas rādiuss, *R* – apvilktās riņķa līnijas rādiuss, *p* – pusperimetrs, h_a - augstums pret malu *a*



$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma} = 2R$$

$$a^2 = b^2 + c^2 - 2bc\cos\alpha$$

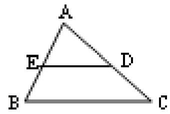
$$S_\Delta = \frac{a \cdot h_a}{2} \qquad S_\Delta = \frac{1}{2}ab\sin\gamma$$

$$S_\Delta = \sqrt{p(p-a)(p-b)(p-c)}$$

$$S_\Delta = \frac{abc}{4R} \qquad S_\Delta = p \cdot r$$

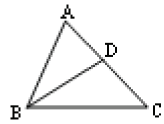
Viduslīnijas īpašība

$$ED = \frac{1}{2}BC$$



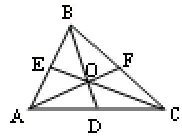
Bisektrises īpašība

$$\frac{AD}{DC} = \frac{AB}{BC}$$



Mediānas īpašība

$$\frac{BO}{OD} = \frac{AO}{OF} = \frac{CO}{OE} = \frac{2}{1}$$



Taisnleņķa trijstūris

a, b – katetes, h_c - augstums pret hipotenūzu, a_c, b_c - katešu projekcijas uz hipotenūzas

$$h_c^2 = a_c \cdot b_c \qquad a^2 = a_c \cdot c$$

$$b^2 = b_c \cdot c \qquad \frac{a^2}{b^2} = \frac{a_c}{b_c}$$

Regulārs trijstūris

a – mala, *h* – augstums, *r* – ievilktās riņķa līnijas rādiuss, *R* – apvilktās riņķa līnijas rādiuss

$$h = \frac{a\sqrt{3}}{2} \qquad r = \frac{a\sqrt{3}}{6} \qquad R = \frac{a\sqrt{3}}{3}$$

$$S = \frac{a^2\sqrt{3}}{4}$$

Līdzīgi trijstūri

$$\frac{AB}{A_1B_1} = \frac{AC}{A_1C_1} = \frac{BC}{B_1C_1} = \frac{P_{ABC}}{P_{A_1B_1C_1}} = k$$

$$\frac{S_{ABC}}{S_{A_1B_1C_1}} = k^2$$

Paralelograms

a, b – malas, d_1, d_2 - diagonāles, h_a - augstums pret malu *a*, α – leņķis starp malām

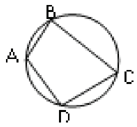
$$2(a^2 + b^2) = d_1^2 + d_2^2$$

$$S = a \cdot h_a \qquad S = ab\sin\alpha$$

Ievilkti un apvilkti četrstūri

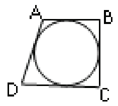
Ievilkts četrstūris *ABCD*

$$\angle A + \angle C = \angle B + \angle D$$



Apvilkts četrstūris *ABCD*

$$AB + CD = AD + BC$$

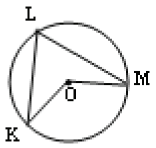


Trapece

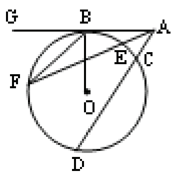
a, b – pamata malas, *h* – augstums

$$S = \frac{a+b}{2} \cdot h$$

Nogriežņi un leņķi, kas saistīti ar riņķa līniju



$$\angle KLM = \frac{1}{2}\angle KOM$$

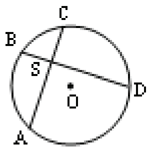


$$\angle FAD = \frac{1}{2}\left(\overset{\smile}{FD} - \overset{\smile}{EC}\right)$$

$$\angle FBG = \frac{1}{2}\overset{\smile}{FB}$$

$$AE \cdot AF = AC \cdot AD$$

$$AB^2 = AC \cdot AD$$



$$\angle BSA = \frac{1}{2}\left(\overset{\smile}{BA} + \overset{\smile}{CD}\right)$$

$$AS \cdot SC = BS \cdot SD$$

Regulāri n – stūri

a_n - mala, h_a - apotēma, *r* – ievilktās riņķa līnijas rādiuss, *R* – apvilktās riņķa līnijas rādiuss, *P* - perimetrs

$$S = \frac{1}{2}P \cdot h_a \qquad a_n = 2R \cdot sin\frac{180^\circ}{n}$$

$$a_n = 2r \cdot tg\frac{180^\circ}{n}$$

Prizma

$V = S_{pam.} \cdot H$, *H* – augstums

Cilindrs

R – rādiuss, *H* – augstums

$$S_{sānu} = 2\pi \cdot R \cdot H$$

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

Piramīda

h_s - apotēma, *P* – pamata perimetrs, α – reg. pir. divpl. kakts pie pamata, *H* – augstums

$$S_{sānu.reg.} = \frac{1}{2}P \cdot h_s \qquad S_{sānu.reg.} = \frac{S_{pam.}}{cos\,\alpha}$$

$$V = \frac{1}{3}S_{pam} \cdot H$$

Nošķelta piramīda

P_1, P_2 – pam. perimetri, h_s - apotēma, *H* – augstums, S_1, S_2 - pamatu laukumi

$$S_{sānu.reg.} = \frac{1}{2}(P_1 + P_2) \cdot h_s$$

$$V = \frac{H}{3}\left(S_1 + S_2 + \sqrt{S_1S_2}\right)$$

Konuss

R – rādiuss, *l* – veidule, *H* – augstums, α – sānu virsmas izklājuma centra leņķis (grādos)

$$S_{sānu} = \pi \cdot R \cdot l \qquad S_{sānu} = \frac{\pi \cdot l^2 \cdot \alpha}{360^\circ}$$

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

Nošķelts konuss

$R_1\ R_2$ – pamatu rādiusi, *l* – veidule, *H* – augstums

$$S_{sānu} = \pi(R_1 + R_2) \cdot l$$

$$V = \frac{\pi \cdot H}{3}\left(R_1^2 + R_1R_2 + R_2^2\right)$$

Lode un tās daļas

R – rādiuss, *H* – segmenta augstums

$$S_{sf.virsma} = 4 \cdot \pi \cdot R^2 \qquad V_{lode} = \frac{4}{3}\pi \cdot R^3$$

$$S_{sf.segm.virsma} = 2 \cdot \pi \cdot R \cdot H$$

$$V_{segmentam} = \pi \cdot H^2\left(R - \frac{H}{3}\right)$$

$$V_{sekt.} = \frac{2}{3}\pi \cdot R^2 \cdot H$$

Riņķis un riņķa līnija

R – rādiuss, l_α – garums lokam, kura centra leņķis ir α

$$C = 2 \cdot \pi \cdot R \qquad l_\alpha = \frac{\pi \cdot R \cdot \alpha}{180^\circ}$$

$$S = \pi \cdot R^2 \qquad S_{sekt} = \frac{\pi \cdot R^2 \cdot \alpha}{360^\circ}$$

Vektori

$$A(x_1; y_1) \quad B(x_2; y_2)$$

$$\overrightarrow{AB} = (x_2 - x_1;\ y_2 - y_1)$$

$$\vec{a} = (a_x; a_y) \quad \vec{b} = (b_x; b_y)$$

$$\vec{a} + \vec{b} = (a_x + b_x; a_y + b_y)$$

$$\vec{a} - \vec{b} = (a_x - b_x; a_y - b_y)$$

$$|\vec{a}| = \sqrt{a_x^2 + a_y^2}$$