Matemática

POLIEDRO
SISTEMA DE ENSINO

Potenciação e radiciação

Potenciação

$$a^n = \underbrace{a \cdot a \cdot a \cdot a \cdot a \cdot \ldots \cdot a}_{n \text{ fatores}}$$

$$a^0 = 1$$

1. $a^m \cdot a^n = a^{m+n}$
2. $\frac{a^m}{a^n} = a^{m-n}, a \neq 0$
3. $\left(a^m\right)^n = a^{m \cdot n}$
4. $(a \cdot b)^n = a^n \cdot b^n$
5. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$
6. $a^{-n} = \frac{1}{a^n}, a \neq 0$

Radiciação

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

1. $\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
2. $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}, b \neq 0$
3. $\left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m}$
4. $\sqrt[m]{\sqrt[n]{a}} = \sqrt[n \cdot m]{a}$
5. $\sqrt[n]{a^m} = a^{\frac{m}{n}}$
6. $\sqrt[n \cdot p]{a^{m \cdot p}} = \sqrt[n]{a^m}$

Produtos notáveis e fatoração

$$(a+b) \cdot (a-b) = a^2 - b^2$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

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

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

$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2 \cdot (ab + ac + bc)$$

$$ab + ac = a \cdot (b+c)$$

$$ab + ac + db + dc = a \cdot (b+c) + d \cdot (b+c) = (b+c) \cdot (a+d)$$

$ax^2 + bx + c = a \cdot (x - a_1) \cdot (x - a_2)$, em que a_1 e a_2 são raízes de $ax^2 + bx + c = 0$

$$a^3 + b^3 = (a+b) \cdot \left(a^2 - ab + b^2\right)$$

$$a^3 - b^3 = (a-b) \cdot \left(a^2 + ab + b^2\right)$$

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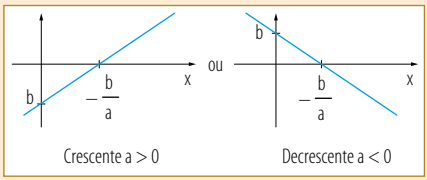
Função do 1º grau

$f(x) = ax + b \qquad (a \neq 0)$



Função do 2º grau

$f(x) = ax^2 + bx + c \qquad (a \neq 0)$

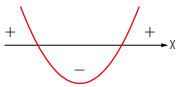
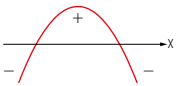
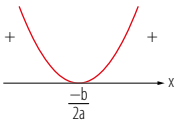
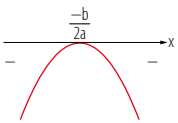
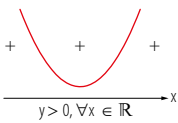
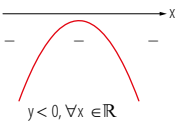
Raízes: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Soma das raízes: $\frac{-b}{a}$

Produto das raízes: $\frac{c}{a}$

Discriminante: $\Delta = b^2 - 4ac$

- $\Delta > 0$: duas raízes reais diferentes
- $\Delta = 0$: duas raízes reais iguais
- $\Delta < 0$: $\nexists$ raízes reais

	a > 0	a < 0
Δ > 0		
Δ = 0		
Δ < 0		

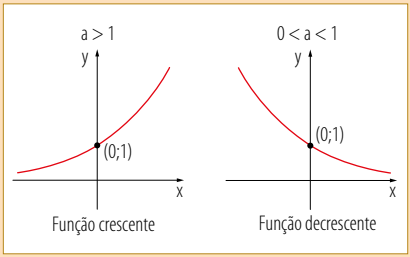
Vértice: $x_v = \frac{-b}{2a}$ e $y_v = \frac{-\Delta}{4a}$

Imagem: $\left\{ y \in \mathbb{R} \mid y \geq \frac{-\Delta}{4a} \text{ se } a > 0 \text{ ou } y \leq \frac{-\Delta}{4a} \text{ se } a < 0 \right\}$ **Domínio:** $\mathbb{R}$

Função exponencial

$f(x) = a^x \ (a > 0 \text{ e } a \neq 1)$

$Im_f = \mathbb{R}_+^* \quad D_f = \mathbb{R}$



- $a^{f(x)} = a^{g(x)} \Leftrightarrow f(x) = g(x)$
- Se $a > 1$; $a^{f(x)} > a^{g(x)} \Leftrightarrow f(x) > g(x)$
- Se $0 < a < 1$; $a^{f(x)} > a^{g(x)} \Leftrightarrow f(x) < g(x)$

Função logarítmica

$\log_b a = x \Leftrightarrow a = b^x \ (a > 0 \text{ e } 0 < b \neq 1)$

$\log_c(a \cdot b) = \log_c a + \log_c b; a > 0, b > 0, 0 < c \neq 1$

$\log_c\left(\frac{a}{b}\right) = \log_c a - \log_c b; \ a > 0, \ b > 0, \ 0 < c \neq 1$

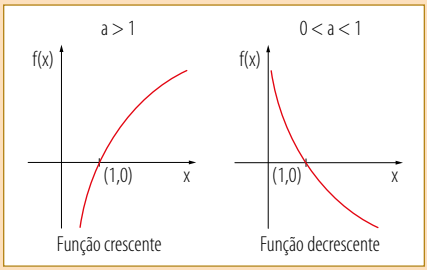
$\log_c a^m = m \cdot \log_c a; a > 0, 0 < c \neq 1 \text{ e } m \in \mathbb{R}$

$\log_{c^m} a = \frac{1}{m} \cdot \log_c a; \ a > 0, \ 0 < c \neq 1 \text{ e } m \in \mathbb{R}^*$

$\log_c a = \frac{\log_d a}{\log_d c}; \ a > 0, \ 0 < c \neq 1 \text{ e } 0 < d \neq 1$

$f(x) = \log_a x \ (a > 0 \text{ e } a \neq 1)$

$Im_f = \mathbb{R} \qquad D_f = \mathbb{R}_+^*$



PA e PG

PA

$(a_1, a_2, a_3, a_4, ..., a_{n-1}, a_n), n \in \mathbb{N}$
$a_n = a_{n-1} + r$

- PA (..., a, b, c, ...)
  $a + c = 2b$
- PA $(a_1, a_2, ..., a_{n-1}, a_n)$
  $a_1 + a_n = a_2 + a_{n-1} = ...$

Termo geral: $a_n = a_1 + (n-1)r$

Soma dos n termos: $S_n = \frac{(a_1 + a_n)n}{2}$

PG

$(a_1, a_2, a_3, a_4, ..., a_{n-1}, a_n), n \in \mathbb{N}$
$a_n = a_{n-1} \cdot q$

- PG (..., a, b, c, ...)
  $a \cdot c = b^2$
- PG $(a_1, a_2, ..., a_{n-1}, a_n)$
  $a_1 \cdot a_n = a_2 \cdot a_{n-1} = ...$

Termo geral: $a_n = a_1 \cdot q^{n-1}$

Soma dos n primeiros termos: $S_n = \frac{a_1(1-q^n)}{1-q}$

$S_\infty = \frac{a_1}{1-q}, -1 < q < 1$

Análise combinatória

Fatorial

$0! = 1; 1! = 1$
$n! = n \cdot (n-1)!, n \in \mathbb{N}$ e $n > 1$

Permutação

Simples: $P_n = n!$

Com repetição: $p_n^{\alpha, \beta, \gamma} = \frac{n!}{\alpha! \beta! \gamma!}$

Arranjo

Simples: $A_{n,p} = \frac{n!}{(n-p)!}$

Com repetição: $(AR)_{n,p} = n^p$

Combinação simples

$C_{n,p} = \frac{n!}{p!(n-p!)} = \binom{n}{p}$

Estatística

Médias

$M_a = \bar{x} = \frac{x_1 + x_2 + ... + x_n}{n}$

$M_{ap} = \frac{x_1 \cdot p_1 + x_2 \cdot p_2 + ... + x_n \cdot p_n}{p_1 + p_2 + ... + p_n}$

$M_g = \sqrt[n]{x_1 \cdot x_2 \cdot ... \cdot x_n}$

$M_h = \frac{1}{\left(\frac{\frac{1}{x_1} + \frac{1}{x_2} + ... + \frac{1}{x_n}}{n}\right)}$

$M_q = \sqrt{\frac{x_1^2 + x_2^2 + ... + x_n^2}{n}}$

Moda

É o valor que ocorre com a maior frequência.

Mediana

É o valor central, ou a média aritmética dos dois valores centrais, do conjunto organizado em ordem crescente ou decrescente.

Amplitude total

É a diferença entre o maior e o menor valor do conjunto.

Desvio médio

$\text{Desvio médio} = \frac{\sum_{i=1}^{n} |x_i - \bar{x}|}{n}$

Desvio padrão

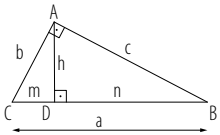
$s = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n}}$

Variância

s^2

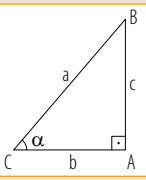
Trigonometria

Relações métricas no triângulo retângulo



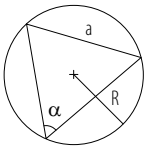
$$h^2 = m \cdot n$$
$$b^2 = a \cdot m$$
$$c^2 = a \cdot n$$
$$b \cdot c = a \cdot h$$
$$a^2 = b^2 + c^2 \text{ (Pitágoras)}$$

Razões trigonométricas

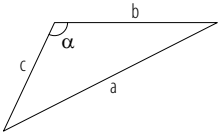


$$\operatorname{sen}\alpha = \frac{c}{a}$$
$$\cos\alpha = \frac{b}{a}$$
$$\operatorname{tg}\alpha = \frac{c}{b}$$

Triângulo qualquer



$$\frac{a}{\operatorname{sen}\alpha} = 2R$$



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

Valores notáveis

	seno	cosseno	tangente
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	–

Relações fundamentais

$$\operatorname{sen}^2 x + \cos^2 x = 1 \left(\forall x \in \mathbb{R}\right)$$
$$\operatorname{tg} x = \frac{\operatorname{sen} x}{\cos x} \left(x \neq \frac{\pi}{2} + k\pi, k \in \mathbb{Z}\right)$$
$$\operatorname{cotg} x = \frac{\cos x}{\operatorname{sen} x} \left(x \neq k\pi, k \in \mathbb{Z}\right)$$
$$\sec x = \frac{1}{\cos x} \left(x \neq \frac{\pi}{2} + k\pi, k \in \mathbb{Z}\right)$$
$$\operatorname{cossec} x = \frac{1}{\operatorname{sen} x} \left(x \neq k\pi, k \in \mathbb{Z}\right)$$

Consequências $\left(x \neq \frac{k\pi}{2}\right)$

$$\operatorname{cotg} x = \frac{1}{\operatorname{tg} x}$$
$$1 + \operatorname{tg}^2 x = \sec^2 x$$
$$1 + \operatorname{cotg}^2 x = \operatorname{cossec}^2 x$$
$$\cos^2 x = \frac{1}{1 + \operatorname{tg}^2 x}$$
$$\operatorname{sen}^2 x = \frac{\operatorname{tg}^2 x}{1 + \operatorname{tg}^2 x}$$

Funções circulares inversas

$$y = \operatorname{arcsen} x \Leftrightarrow \operatorname{sen} y = x \text{ e } -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$
$$y = \operatorname{arccos} x \Leftrightarrow \cos y = x \text{ e } 0 \leq y \leq \pi$$
$$y = \operatorname{arctg} x \Leftrightarrow \operatorname{tg} y = x \text{ e } -\frac{\pi}{2} < y < \frac{\pi}{2}$$

Adição e subtração de arcos

$$\cos(a+b) = \cos a \cdot \cos b - \operatorname{sen} a \cdot \operatorname{sen} b$$

$$\cos(a-b) = \cos a \cdot \cos b + \operatorname{sen} a \cdot \operatorname{sen} b$$

$$\operatorname{sen}(a+b) = \operatorname{sen} a \cdot \cos b + \operatorname{sen} b \cdot \cos a$$

$$\operatorname{sen}(a-b) = \operatorname{sen} a \cdot \cos b - \operatorname{sen} b \cdot \cos a$$

$$\operatorname{tg}(a+b) = \frac{\operatorname{tg} a + \operatorname{tg} b}{1 - \operatorname{tg} a \cdot \operatorname{tg} b}$$

$$\operatorname{tg}(a-b) = \frac{\operatorname{tg} a - \operatorname{tg} b}{1 + \operatorname{tg} a \cdot \operatorname{tg} b}$$

Arco duplo

$$\operatorname{sen} 2a = 2 \cdot \operatorname{sen} a \cdot \cos a$$

$$\cos 2a = \begin{cases} \cos^2 a - \operatorname{sen}^2 a \\ \text{ou} \\ 2\cos^2 a - 1 \\ \text{ou} \\ 1 - 2\operatorname{sen}^2 a \end{cases}$$

$$\operatorname{tg} 2a = \frac{2\operatorname{tg} a}{1 - \operatorname{tg}^2 a}$$

Arco triplo

$$\operatorname{sen} 3a = 3\operatorname{sen} a - 4\operatorname{sen}^3 a$$

$$\cos 3a = 4\cos^3 a - 3\cos a$$

$$\operatorname{tg} 3a = \frac{3\operatorname{tg} a - \operatorname{tg}^3 a}{1 - 3\operatorname{tg}^2 a}$$

Arco metade

$$\operatorname{sen}\frac{x}{2} = \pm\sqrt{\frac{1-\cos x}{2}}$$

$$\cos\frac{x}{2} = \pm\sqrt{\frac{1+\cos x}{2}}$$

$$\operatorname{tg}\frac{x}{2} = \pm\sqrt{\frac{1-\cos x}{1+\cos x}}$$

Transformação em produto

$$\cos p + \cos q = 2 \cdot \cos\frac{p+q}{2} \cdot \cos\frac{p-q}{2}$$

$$\cos p - \cos q = -2 \cdot \operatorname{sen}\frac{p+q}{2} \cdot \operatorname{sen}\frac{p-q}{2}$$

$$\operatorname{sen} p + \operatorname{sen} q = 2 \cdot \operatorname{sen}\frac{p+q}{2} \cdot \cos\frac{p-q}{2}$$

$$\operatorname{sen} p - \operatorname{sen} q = 2 \cdot \operatorname{sen}\frac{p-q}{2} \cdot \cos\frac{p+q}{2}$$

$$\operatorname{tg} p + \operatorname{tg} q = \frac{\operatorname{sen}(p+q)}{\cos p \cdot \cos q}$$

$$\operatorname{tg} p - \operatorname{tg} q = \frac{\operatorname{sen}(p-q)}{\cos p \cdot \cos q}$$

Equações trigonométricas fundamentais

$$\operatorname{sen}\alpha = \operatorname{sen}\beta \Rightarrow \alpha = \beta + 2k\pi \text{ ou } \alpha = (\pi - \beta) + 2k\pi$$

$$\cos\alpha = \cos\beta \Rightarrow \alpha = \pm\beta + 2k\pi$$

$$\operatorname{tg}\alpha = \operatorname{tg}\beta \Rightarrow \alpha = \beta + k\pi$$

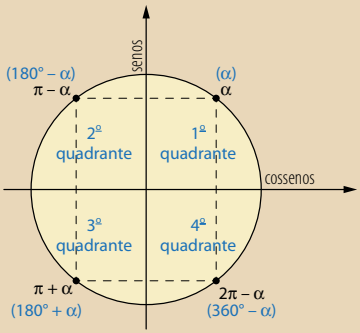
Simetrias no ciclo trigonométrico

$$\begin{cases} \operatorname{sen}(\pi - \alpha) = \operatorname{sen}\alpha \\ \cos(\pi - \alpha) = -\cos\alpha \end{cases}$$

$$\begin{cases} \operatorname{sen}(180° - \alpha) = \operatorname{sen}\alpha \\ \cos(180° - \alpha) = -\cos\alpha \end{cases}$$

$$\begin{cases} \operatorname{sen}(\pi + \alpha) = -\operatorname{sen}\alpha \\ \cos(\pi + \alpha) = -\cos\alpha \end{cases}$$

$$\begin{cases} \operatorname{sen}(180° + \alpha) = -\operatorname{sen}\alpha \\ \cos(180° + \alpha) = -\cos\alpha \end{cases}$$

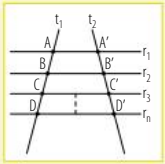


$$\begin{cases} \operatorname{sen}(2\pi - \alpha) = -\operatorname{sen}\alpha \\ \cos(2\pi - \alpha) = \cos\alpha \end{cases}$$

$$\begin{cases} \operatorname{sen}(360° - \alpha) = -\operatorname{sen}\alpha \\ \cos(360° - \alpha) = \cos\alpha \end{cases}$$

Geometria plana

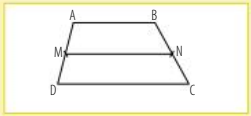
Teorema de Tales



$r_1 // r_2 // r_3 // ... // r_n$

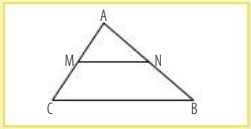
$$\frac{AB}{A'B'} = \frac{BC}{B'C'} = \frac{CD}{C'D'} = \frac{AC}{A'C'} = \frac{AD}{A'D'}$$

Base média do trapézio



$\overline{MN} // \overline{AB} // \overline{CD}$, tem-se: $MN = \frac{AB + CD}{2}$

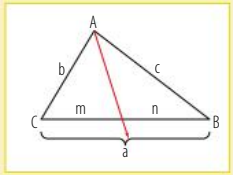
Base média do triângulo



$AM = MC;\ AN = NB$

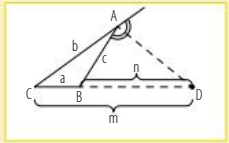
$\overline{MN}$ é a base média; $MN = \frac{BC}{2}$

Teorema da bissetriz interna



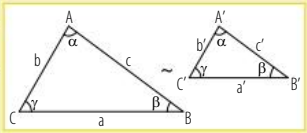
$$\frac{b}{m} = \frac{c}{n}$$

Teorema da bissetriz externa



$$\frac{b}{m} = \frac{c}{n}$$

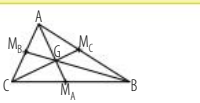
Semelhança de triângulos



$$\frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'} = k$$

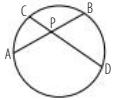
$$\frac{\text{Área } \triangle ABC}{\text{Área } \triangle A'B'C'} = k^2$$

Baricentro do triângulo

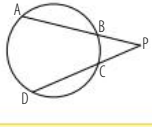


$$\frac{AG}{GM_A} = \frac{BG}{GM_B} = \frac{CG}{GM_C} = 2$$

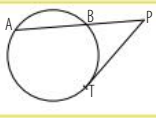
Relações métricas no círculo



$PA \cdot PB = PC \cdot PD$

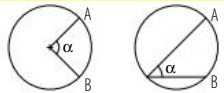


$PA \cdot PB = PC \cdot PD$

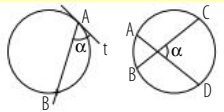


$(PT)^2 = PA \cdot PB$

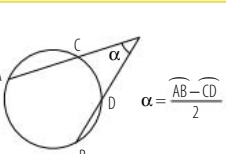
Arcos e ângulos



$\alpha = \overset{\frown}{AB}$ $\qquad$ $\alpha = \frac{\overset{\frown}{AB}}{2}$

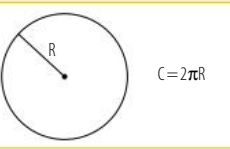


$\alpha = \frac{\overset{\frown}{AB}}{2}$ $\qquad$ $\alpha = \frac{\overset{\frown}{AB} + \overset{\frown}{CD}}{2}$



$\alpha = \frac{\overset{\frown}{AB} - \overset{\frown}{CD}}{2}$

Comprimento da circunferência



$C = 2\pi R$

Polígonos convexos

Sendo:
n = número de lados
d = número de diagonais
S_i = soma dos ângulos internos
S_e = soma dos ângulos externos

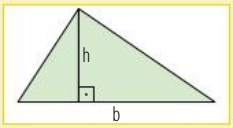
Tem-se:

$$d = \frac{n(n-3)}{2}$$

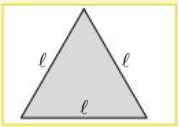
$S_i = (n-2) \cdot 180°$
$S_e = 360°$

Áreas

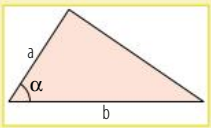
Triângulos



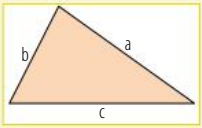
$$\text{área} = \frac{bh}{2}$$



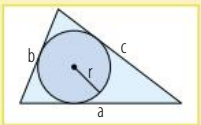
$$\text{área} = \frac{\ell^2 \cdot \sqrt{3}}{4}$$



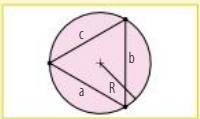
$$\text{área} = \frac{1}{2}ab \cdot \operatorname{sen}\alpha$$



$$\text{área} = \sqrt{p(p-a)\cdot(p-b)\cdot(p-c)},$$
em que $p = \frac{a+b+c}{2}$

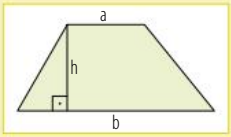


$$\text{área} = pr,$$
em que $p = \frac{a+b+c}{2}$



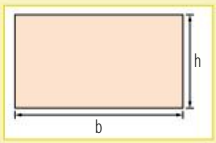
$$\text{área} = \frac{abc}{4R}$$

Trapézio



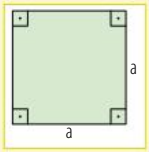
$$\text{área} = \frac{(a+b)\cdot h}{2}$$

Retângulo



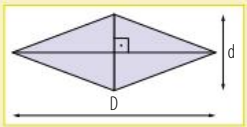
$$\text{área} = b \cdot h$$

Quadrado



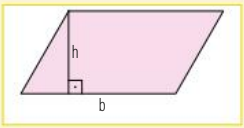
$$\text{área} = a^2$$

Losango



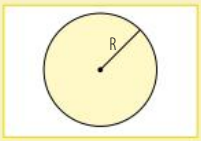
$$\text{área} = \frac{D \cdot d}{2}$$

Paralelogramo



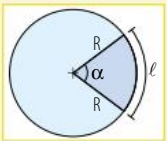
$$\text{área} = b \cdot h$$

Círculo



$$\text{área} = \pi R^2$$

Setor circular



$$\text{área} = \frac{\alpha \cdot \pi \cdot R^2}{360°},\ \alpha \text{ em graus}$$

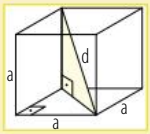
$$\text{área} = \frac{\alpha \cdot R^2}{2},\ \alpha \text{ em radianos}$$

$$\text{área} = \frac{\ell \cdot R}{2}$$

Geometria espacial

Sólidos

Cubo

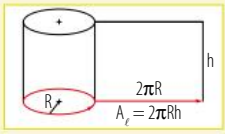


$\text{área} = 6a^2$

$\text{Volume} = a^3$

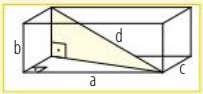
$\text{Diagonal} = d = a\sqrt{3}$

Cilindro



$\text{Volume} = \pi R^2 \cdot h$

Paralelepípedo reto-retângulo

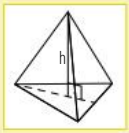


$\text{área} = 2\,(ab + ac + bc)$

$\text{Volume} = a \cdot b \cdot c$

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

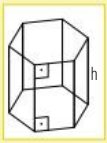
Pirâmide



$\text{Volume} = \frac{1}{3} A_B \cdot h,$

em que A_B = área da base

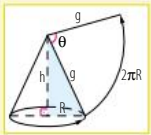
Prisma



$\text{Volume} = A_B \cdot h,$

em que A_B = área da base

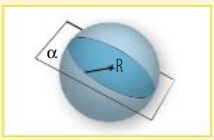
Cone



$\text{área lateral} = \pi Rg$

$\text{Volume} = \frac{\pi R^2 \cdot h}{3} \qquad \theta = \frac{360° \cdot R}{g}$

Esfera



$\text{área} = 4\pi R^2$

$\text{volume} = \frac{4}{3}\pi R^3$

Poliedros convexos

Relação de Euler

Sendo:
V = nº de vértices
A = nº de arestas
F = nº de faces

Tem-se:
$V - A + F = 2$

Geometria analítica

Equações da reta

Equação geral da reta: $ax + by + c = 0$

Equação reduzida da reta: $y = mx + n$

Feixes de retas

Por $(x_0; y_0)$: $y - y_0 = m\,(x - x_0)$, $m \in \mathbb{R}$

Paralelas: $y = mx + n$, m fixo e $n \in \mathbb{R}$

Posições relativas entre retas

$r // s \iff m_r = m_s$

$r \perp s \iff m_r \cdot m_s = -1$

Ângulo entre retas

$$\text{tg}\theta = \left|\frac{m_s - m_r}{1 + m_s \cdot m_r}\right|$$

Distâncias

Entre dois pontos: $d_{A;B} = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$

Entre ponto e reta: $d_{P,r} = \frac{|ax_P + by_P + c|}{\sqrt{a^2 + b^2}}$

Baricentro do triângulo ABC

$$G = \left(\frac{x_A + x_B + x_C}{3}; \frac{y_A + y_B + y_C}{3}\right)$$

Condição de alinhamento para três pontos

$$\begin{vmatrix} x_A & y_A & 1 \\ x_B & y_B & 1 \\ x_C & y_C & 1 \end{vmatrix} = 0$$

Área do triângulo ABC

$$\text{área} = \frac{1}{2}\left|\begin{matrix} x_A & y_A & 1 \\ x_B & y_B & 1 \\ x_C & y_C & 1 \end{matrix}\right|$$

Equações da circunferência

Equação geral da circunferência:
$x^2 + y^2 - 2ax - 2by + a^2 + b^2 - r^2 = 0$

Equação reduzida da circunferência de centro (x_0, y_0):
$(x - x_0)^2 + (y - y_0)^2 = r^2$

Números complexos

$$i^2 = -1$$

$$i^0 = 1;\ i^1 = i;\ i^2 = -1;\ i^3 = -i;\ i^4 = 1;\ \ldots$$
$$z = a + bi,\ a \in \mathbb{R} \text{ e } b \in \mathbb{R}$$

Conjugado de z

$$z = a + bi \Rightarrow \bar{z} = a - bi$$

Módulo de z

$$|z| = \sqrt{a^2 + b^2}$$

Forma trigonométrica de z

$$z = |z|(\cos\theta + i \cdot \operatorname{sen}\theta)$$

Operações na forma trigonométrica

Sejam:

$$z = |z|(\cos\theta + i \cdot \operatorname{sen}\theta)$$
$$z_1 = |z_1|(\cos\theta_1 + i \cdot \operatorname{sen}\theta_1)$$
$$z_2 = |z_2|(\cos\theta_2 + i \cdot \operatorname{sen}\theta_2)$$

$$z_1 \cdot z_2 = |z_1| \cdot |z_2| \cdot [\cos(\theta_1 + \theta_2) + i \cdot \operatorname{sen}(\theta_1 + \theta_2)]$$

$$\frac{z_1}{z_2} = \frac{|z_1|}{|z_2|}[\cos(\theta_1 - \theta_2) + i \cdot \operatorname{sen}(\theta_1 - \theta_2)]$$

$$z^n = |z|^n \cdot [\cos(n\theta) + i \cdot \operatorname{sen}(n\theta)],\ n \in \mathbb{N}$$

$$\sqrt[n]{z} = \sqrt[n]{|z|} \cdot \left[\cos\left(\frac{\theta}{n} + \frac{2k\pi}{n}\right) + i \cdot \operatorname{sen}\left(\frac{\theta}{n} + \frac{2k\pi}{n}\right)\right],$$
$$n \in \mathbb{N},\ k \in \mathbb{N} \text{ e } 0 \le k < n$$

Matemática financeira básica

Porcentagem

$$x\% = \frac{x}{100}$$

$$x\% \text{ do total} = \frac{x}{100} \cdot \text{total}$$

Juros simples

$$J = C \cdot i \cdot t$$
$$M = C + J = C \cdot (1 + it)$$

Juros compostos

$$M = C \cdot (1 + i)^t$$

Acréscimos e descontos

Valor inicial × fator de correção = Valor final

$$V_0 \times \alpha = V_1$$

Lucro e prejuízo

Lucro = Venda − Custo
Prejuízo = Custo − Venda

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POLIEDRO
SISTEMA DE ENSINO