

A formula sheet

Inline math sits on the baseline of the prose: the quadratic formula gives the roots of $ax^2 + bx + c = 0$ as $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, and a right triangle obeys $a^2 + b^2 = c^2$.

Algebra

$$(a + b)^n = \sum_{k=0}^n \binom{n}{k} a^{n-k} b^k \quad \binom{n}{k} = \frac{n!}{k!(n-k)!}$$

$$\log_b(xy) = \log_b x + \log_b y \quad a^m \cdot a^n = a^{m+n} \quad \sqrt[n]{a^m} = a^{m/n}$$

Trigonometry

$$\sin^2 \theta + \cos^2 \theta = 1 \quad \tan \theta = \frac{\sin \theta}{\cos \theta} \quad \sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta$$

The law of cosines, $c^2 = a^2 + b^2 - 2ab \cos \gamma$, reduces to Pythagoras when $\gamma = 90^\circ$.

Calculus

$$\frac{d}{dx} x^n = nx^{n-1} \quad \int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1) \quad \int_a^b f(x) dx = F(b) - F(a)$$

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \quad \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e \quad e^{i\pi} + 1 = 0$$

Series and the golden ratio

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6} \quad \varphi = \frac{1 + \sqrt{5}}{2} = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}$$

Vectors, accents and alphabets

Vectors $\vec{v}$, unit vectors $\hat{i}$, means $\bar{x}$, time derivatives $\dot{x}$ and $\ddot{x}$, estimates $\hat{\theta}$, and the alphabets: $\mathbb{R}^n$, $\mathcal{L}$, $\mathfrak{g}$, $\mathbf{A}$, $\mathbb{T}$, $\mathbf{x}$.

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C} \quad \mathbf{a} \cdot \mathbf{b} = \|\mathbf{a}\| \|\mathbf{b}\| \cos \theta \quad \mathbf{a} \times \mathbf{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}$$

Greek, upper and lower: $\alpha, \beta, \gamma, \delta, \epsilon, \epsilon, \theta, \lambda, \mu, \pi, \sigma, \varphi, \omega$ and $\Gamma, \Delta, \Theta, \Lambda, \Pi, \Sigma, \Phi, \Omega$.