

Class11-Maths-JEE-Mains-Formulas

October 18, 2025

Lesson	Concept	Formula / Key Point
Sets	Union	$A \cup B = \{x : x \in A \text{ or } x \in B\}$
	Intersection	$A \cap B = \{x : x \in A \text{ and } x \in B\}$
	Complement	$A' = U - A$
	Cardinality	$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
Relations & Functions	Function	A relation where every input has exactly one output
	Domain and Range	Set of inputs (domain), outputs (range)
	Types of Functions	One-one, onto, bijective
Trigonometry	Identities	$\sin^2 x + \cos^2 x = 1, 1 + \tan^2 x = \sec^2 x, 1 + \cot^2 x = \csc^2 x$
	Angle Formulas	$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
	Double Angle	$\sin 2A = 2 \sin A \cos A, \cos 2A = \cos^2 A - \sin^2 A$
Complex Numbers	General Form	$z = a + ib$
	Conjugate	$\bar{z} = a - ib$
	Modulus	$ z = \sqrt{a^2 + b^2}$
Quadratic Equations	Roots	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
	Discriminant	$D = b^2 - 4ac$
	Sum & Product of Roots	$\alpha + \beta = -\frac{b}{a}, \alpha\beta = \frac{c}{a}$

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Sequence & Series	AP nth Term	$a_n = a + (n - 1)d$
	—	—
	AP Sum	$S_n = \frac{n}{2}[2a + (n - 1)d]$
	—	—
	GP nth Term	$a_n = ar^{n-1}$
	—	—
Permutation & Combination	GP Sum (finite)	$S_n = a \frac{r^n - 1}{r - 1}, r \neq 1$
	—	—
	GP Sum (infinite)	$S_\infty = \frac{a}{1-r}, r < 1$
	—	—
	Permutation	${}_nP_r = \frac{n!}{(n-r)!}$
	—	—
Permutation & Combination	Combination	${}_nC_r = \frac{n!}{r!(n-r)!}$
	—	—
	Property	${}_nC_r = {}_nC_{n-r}$
Binomial Theorem	Expansion	$(x + a)^n = \sum_{k=0}^n {}^nC_k x^{n-k} a^k$
	—	—
Binomial Theorem	General Term	$T_{k+1} = {}^nC_k x^{n-k} a^k$
	—	—
Straight Lines	Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$
	—	—
	Point-Slope Form	$y - y_1 = m(x - x_1)$
	—	—
	Slope-Intercept Form	$y = mx + c$
	—	—
Conic Sections	Distance	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
	Angle Between Lines	$\tan \theta = \left \frac{m_1 - m_2}{1 + m_1 m_2} \right $
	—	—
	Circle	$(x - h)^2 + (y - k)^2 = r^2$
	—	—
	Parabola	$y^2 = 4ax, x^2 = 4ay$
Conic Sections	—	—
	Ellipse	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
	—	—
	Hyperbola	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$
3D Geometry	—	—
	Distance in 3D	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$
3D Geometry	—	—
	Section Formula	$\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}, \frac{mz_2 + nz_1}{m+n} \right)$
Limits & Derivatives	—	—
	Limit Laws	$\lim_{x \rightarrow a} f(x) = L$
Limits & Derivatives	—	—
	—	—

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Mathematical Reasoning	Standard Limits	$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1, \lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2} = \frac{1}{2}$
	Derivatives	$\frac{d}{dx} x^n = nx^{n-1}, \frac{d}{dx} \sin x = \cos x$
	Logical Connectives	And (), Or (), Not (\neg), If-then (\rightarrow), Iff (\leftrightarrow)
	Contrapositive	$\neg q \rightarrow \neg p$
Statistics	Mean	$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$
	Variance	$\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$
	Standard Deviation	$\sigma = \sqrt{\sigma^2}$
Probability	Basic Probability	$P(A) = \frac{\text{Favorable}}{\text{Total}}$
	Complement	$P(A') = 1 - P(A)$
	Addition Rule	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
	Independence	$P(A \cap B) = P(A) \cdot P(B)$