Class12-Maths-CBSE-Exam-Formulas

October 20, 2025

Chapter	Concept	Formula / Key Point	Explanation of Variables
Relations and Functions	Types of Relations	[Reflexive, Symmetric, Transitive, Equivalence]	Types describing properties of binary relations
	Types of Functions	[One-one, Onto, Bijective]	One-one: unique outputs; Onto: full range covered; Bijective: both
	Inverse of Function	$[f^{-1}(f(x)) = x]$	$f(x)$ is a function, f^{-1} is its inverse
Inverse Trigonometric Functions	Principal Values	$[\sin^{-1} x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$, $\cos^{-1} x \in [0, \pi]]$	x is input; range shows principal value restrictions
	Identities	$[\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$, $\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}]$	Inverse function identities for complementary angles
Matrices	Matrix Operations	$[(A+B)^T = A^T + B^T$, $(AB)^T = B^T A^T]$	A, B are matrices; T is transpose
	Inverse of Matrix	$[A^{-1} = \frac{1}{\lvert A \rvert} \cdot \mathrm{adj}(A)$ if $\lvert A \rvert \neq 0]$	$\lvert A \rvert$ is determinant; adj is adjugate of A

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Determinants	Properties	[$\|AB\| = \|A\|\|B\|$, $\|A^T\| = \|A\|$]	Determinant of matrix product and transpose
	Area of Triangle	[Area $= \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$]	(x_1, y_1) etc. are triangle vertices
	Cramer's Rule	[$x = \frac{D_x}{D}, y = \frac{D_y}{D}, z = \frac{D_z}{D}$]	D is determinant of main matrix; D_x etc. are for variables
Continuity and Differentiability	Continuity	[$\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x) = f(a)$]	$f(x)$ is continuous if left & right limits equal function value
	Derivatives	[$(uv)' = u'v + uv'$, $(f(g(x)))' = f'(g(x)) \cdot g'(x)$]	Product and chain rule for derivatives
	Implicit Differentiation	[Differentiate both sides of equation w.r.t. x]	Used when y is a function of x but not isolated
Applications of Derivatives	Tangent & Normal	[Slope of tangent: $f'(x)$, Equation: $y - y_1 = m(x - x_1)$]	$f'(x)$ is derivative; (x_1, y_1) is point; m is slope
	Increase/Decrease	[$f'(x) > 0 \quad \text{Increasing}, f'(x) < 0 \quad \text{Decreasing}$]	Positive slope = increasing function; negative = decreasing
	Maxima & Minima	[Use $f'(x) = 0$ and second derivative test]	$f'(x)$ is zero at extrema; $f''(x)$ tells nature
Integrals	Basic Integration	[$\int x^n dx = \frac{x^{n+1}}{n+1} + C$, $\int e^x dx = e^x + C$]	C is constant of integration

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	Integration by Parts	[$\int u \cdot v\,dx = u\int v dx - \int \left(\frac{du}{dx}\int v dx\right) dx$]	Used when product of two functions
	Definite Integral	[$\int_a^b f(x)\,dx = F(b) - F(a)$, $\int_a^b f(x)\,dx = \int_a^b f(a+b-x)\,dx$]	F is antiderivative of f
Applications of Integrals	Area Under Curve	[Area $= \int_a^b [f(x) - g(x)]dx$]	$f(x)$ is upper curve, $g(x)$ is lower curve
	Area Between Curve and Axis	[Area $= \int_a^b f(x)dx$]	Area between function and x-axis
Differential Equations	Order and Degree	[Order = highest derivative, Degree = power of highest derivative]	Applies if equation is polynomial in derivatives
	Variable Separable Method	[$\frac{dy}{dx} = f(x)g(y) \Rightarrow \frac{dy}{g(y)} = f(x)dx$]	Variables separated for integration
Vector Algebra	Dot Product	[$\vec{A} \cdot \vec{B} = \lvert\vec{A}\rvert\lvert\vec{B}\rvert \cos\theta$]	Angle θ between vectors
	Cross Product	[$\vec{A} \times \vec{B} = \lvert\vec{A}\rvert\lvert\vec{B}\rvert \sin\theta \hat{n}$]	$\hat{n}$ is unit vector perpendicular
	Scalar Triple Product	[$\vec{A} \cdot (\vec{B} \times \vec{C}) = \begin{vmatrix} A_x & A_y & A_z \\ B_x & B_y & B_z \\ C_x & C_y & C_z \end{vmatrix}$]	Volume of parallelepiped
Three-Dimensional Geometry	Line Equation	[Vector: $\vec{r} = \vec{a} + \lambda\vec{b}$, Cartesian: $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$]	$\vec{a}$ = point vector, $\vec{b}$ = direction vector
	Plane Equation	[$ax + by + cz + d = 0$, Vector: $\vec{r} \cdot \hat{n} = d$]	(a, b, c) is normal vector
	Distance Between Point & Plane	[$\frac{\lvert ax_1+by_1+cz_1+d\rvert}{\sqrt{a^2+b^2+c^2}}$]	(x_1, y_1, z_1) is point; (a, b, c) is normal to plane

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Linear Programming	Constraints & Feasible Region	[Convert word problems to inequalities; Graph feasible region]	Feasible region = region satisfying all constraints
	Objective Function	$[Z = ax + by \quad \text{Max/Min at corner points}]$	a, b are constants; x, y are variables
Probability	Conditional Probability	$[P(A\|B) = \frac{P(A \cap B)}{P(B)}]$	Probability of A given B has occurred
	Bayes' Theorem	$[P(E_i\|A) = \frac{P(E_i) \cdot P(A\|E_i)}{\sum P(E_j) \cdot P(A\|E_j)}]$	E_i are events; A is observed event
	Independent Events	$[P(A \cap B) = P(A) \cdot P(B)]$	A and B are independent if outcome of one doesn't affect the other