

CBSE Class 12 Mathematics Formula & Definition Master Sheet

(All chapters – full formulas + one-line definitions)

1. Relations and Functions

- Relation: Subset of $A \times B$, describing links between elements.
- Function: Special relation where each element of domain has exactly one image in co-domain.
- Types of relations:
 - Reflexive: $(a,a) \in R \forall a \in A$.
 - Symmetric: $(a,b) \in R \Rightarrow (b,a) \in R$.
 - Transitive: $(a,b), (b,c) \in R \Rightarrow (a,c) \in R$.
 - Equivalence: Reflexive + Symmetric + Transitive.
 - Anti-symmetric: $(a,b), (b,a) \in R \Rightarrow a = b$.
- Function types: One-one (injective), onto (surjective), bijective (both – invertible).
- Composition: $(f \circ g)(x) = f(g(x))$.
- Inverse function: If f bijective, f^{-1} exists such that $f^{-1}(f(x)) = x$.

2. Inverse Trigonometric Functions

Principal value branch: Domain restricted so inverse trig is single-valued.

Function	Domain	Range
$\sin^{-1}x$	$[-1,1]$	$[-\pi/2, \pi/2]$
$\cos^{-1}x$	$[-1,1]$	$[0, \pi]$

$\tan^{-1}x$	\mathbb{R}	$(-\pi/2, \pi/2)$
$\cot^{-1}x$	\mathbb{R}	$(0, \pi)$
$\sec^{-1}x$	All real no. x such that $ x \geq 1$	$\left[0, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \pi\right]$
$\operatorname{cosec}^{-1}x$	All real no. x such that $ x \geq 1$	$[-\pi/2, 0) \cup (0, \pi/2]$

Key identities:

- $\sin^{-1}x + \cos^{-1}x = \pi/2$
- $\tan^{-1}x + \cot^{-1}x = \pi/2$
- $\sec^{-1}x + \operatorname{cosec}^{-1}x = \pi/2$
- $\tan^{-1}x - \tan^{-1}y = \tan^{-1}((x-y)/(1+xy))$ (adjust for quadrant)

3. Matrices

- Matrix: Rectangular array of numbers, order $m \times n$.
- Special matrices: zero, identity I_n , diagonal, scalar, symmetric $A^t = A$, skew-symmetric $A^t = -A$.
- Operations:
- $(A+B)_{ij} = [a_{ij} + b_{ij}]$
- Scalar \times A: multiply each entry.
- Multiplication: $(AB)_{ij} = \sum a_{ik} b_{kj}$ ($m \times p$ with $p \times n$ results in $m \times n$).