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MATHEMATICAL SYMBOLS

Basic math symbol

mantrakshar	HINDI	Symbol Name	Meaning / definition	Example
=	बराबर चिह्न	equals sign	equality	$5 = 2+3$; 5 is equal to 2+3
$\neq$	असमान चिह्न	not equal sign	inequality	$5 \neq 4$; 5 is not equal to 4
$\approx$	लगभग समान	approximately equal	approximation	$\sin(0.01) \approx 0.01$, $x \approx y$ means x is approximately equal to y
>	सख्त असमानता	strict inequality	greater than	$5 > 4$; 5 is greater than 4
<	सख्त असमानता	strict inequality	less than	$4 < 5$; 4 is less than 5
$\geq$	असमानता	inequality	greater than or equal to	$5 \geq 4$, $x \geq y$ means x is greater than or equal to y
$\leq$	असमानता	inequality	less than or equal to	$4 \leq 5$, $x \leq y$ means x is less than or equal to y
()	छोटा कोष्ठक	parentheses	calculate expression inside first	$2 \times (3+5) = 16$
{ }	मझला कोष्ठक	flower brackets		
[]	बड़ा कोष्ठक	brackets	calculate expression inside first	^[1] = 18
+	प्लस चिह्न	plus sign	addition	$1 + 1 = 2$
-	घटाव चिह्न	minus sign	subtraction	$2 - 1 = 1$
$\pm$	जोड़- घटाव चिह्न	plus - minus	both plus and minus operations	$3 \pm 5 = 8$ or -2
$\mp$	घटाव -जोड़ चिह्न	minus - plus	both minus and plus operations	$3 \mp 5 = -2$ or 8
*	तारांकन	asterisk	multiplication	$2 * 3 = 6$
x		times sign	multiplication	$2 \times 3 = 6$
·	गुणन बिंदु	multiplication dot	multiplication	$2 \cdot 3 = 6$
÷	विभाजन चिह्न	division sign / obelus	division	$6 \div 2 = 3$
/		division slash	division	$6 / 2 = 3$
—	क्षैतिज रेखा	horizontal line	division / fraction	$\frac{6}{2} = 3$
mod	सापेक्ष	modulo	remainder calculation	$7 \bmod 2 = 1$
.	अवधि	period	decimal point, decimal separator	$2.56 = 2 + 56/100$
ab	शक्ति	power	exponent	$2^3 = 8$
a^b	कैरट	caret	exponent	$2^3 = 8$
$\sqrt{a}$	वर्गमूल	square root	$\sqrt{a} \cdot \sqrt{a} = a$	$\sqrt{9} = \pm 3$
$\sqrt[3]{a}$	घनमूल	cube root	$\sqrt[3]{a} \cdot \sqrt[3]{a} \cdot \sqrt[3]{a} = a$	$\sqrt[3]{8} = 2$

mantrakshar	HINDI	Symbol Name	Meaning / definition	Example
$4\sqrt{a}$	चौथी जड़	fourth root	$4\sqrt{a} \cdot 4\sqrt{a} \cdot 4\sqrt{a} \cdot 4\sqrt{a} = a$	$4\sqrt{16} = \pm 2$
$n\sqrt{a}$	n-वें रूट (कट्टरपंथी)	n-th root (radical)		for $n=3$, $n\sqrt{8} = 2$
%	प्रतिशत	percent	$1\% = 1/100$	$10\% \times 30 = 3$
‰	प्रति-मिली	per-mille	$1\text{‰} = 1/1000 = 0.1\%$	$10\text{‰} \times 30 = 0.3$
ppm	प्रति मिलियन	per-million	$1\text{ppm} = 1/1000000$	$10\text{ppm} \times 30 = 0.0003$
ppb	प्रति अरब	per-billion	$1\text{ppb} = 1/1000000000$	$10\text{ppb} \times 30 = 3 \times 10^{-7}$
ppt	प्रति ट्रिलियन	per-trillion	$1\text{ppt} = 10^{-12}$	$10\text{ppt} \times 30 = 3 \times 10^{-10}$

Geometry symbols

Mantrakshar	Hindi	Symbol Name	Meaning / definition	Example
$\angle$	कोण	angle	formed by two rays	$\angle ABC = 30^\circ$
	मापा कोण	measured angle		$\angle ABC = 30^\circ$
	गोलाकार कोण	spherical angle		$\angle AOB = 30^\circ$
L	समकोण	right angle	$= 90^\circ$	$\alpha = 90^\circ$
°	अंश	degree	$1 \text{ turn} = 360^\circ$	$\alpha = 60^\circ$
deg	अंश	degree	$1 \text{ turn} = 360\text{deg}$	$\alpha = 60\text{deg}$
'	प्रधान	prime	arcminute, $1^\circ = 60'$	$\alpha = 60^\circ 59'$
"	द्वि प्रधान	double prime	arcsecond, $1' = 60''$	$\alpha = 60^\circ 59' 59''$
	रेखा	line	infinite line	
AB	रेखा खंड	line segment	line from point A to point B	
	किरण	ray	line that start from point A	
	वृत्त चाप	arc	arc from point A to point B	$= 60^\circ$
$\perp$	लंब	perpendicular	perpendicular lines (90° angle)	$AC \perp BC$
$\parallel$	समानांतर	parallel	parallel lines	$AB \parallel CD$
$\cong$	सर्वगसम	congruent to	equivalence of geometric shapes and size	$\triangle ABC \cong \triangle XYZ$
$\sim$	समानता / समरूप	similarity	same shapes, not same size	$\triangle ABC \sim \triangle XYZ$
Δ	त्रिकोण	triangle	triangle shape	$\triangle ABC \cong \triangle BCD$
$\$ \$ \text{delim}\{\}\{x-y\}\{\}\$ \$$	दूरी	distance	distance between points x and y	$\$ \$ \text{delim}\{\}\{x-y=5\}\{\}\$ \$$
π		pi constant	$\pi = 3.141592654\dots$ is the ratio between the circumference and diameter of a circle	$c = \pi \cdot d = 2 \cdot \pi \cdot r$
rad		radians	radians angle unit	$360^\circ = 2\pi \text{ rad}$
c		radians	radians angle unit	$360^\circ = 2\pi c$
grad		gradians / gons	grads angle unit	$360^\circ = 400 \text{ grad}$

Algebra symbols

Mantrakshar	Hindi	Symbol Name	Meaning / definition	Example	
x	X चर	x variable	unknown value to find	when $2x = 4$, then $x = 2$	
$\equiv$	समानक	equivalence	identical to		
$\triangleq$	परिभाषा के बराबर	equal by definition	equal by definition		
$:=$	परिभाषा के बराबर	equal by definition	equal by definition		
$\sim$	लगभग समान	approximately equal	weak approximation	$11 \sim 10$	
$\approx$	लगभग समान	approximately equal	approximation	$\sin(0.01) \approx 0.01$	
$\propto$	आनुपातिक	proportional to	proportional to	$y \propto x$ when $y = kx$, k constant	
∞	अनंत चिन्ह	lemniscate	infinity symbol		
$\ll$	से अधिक कम	much less than	much less than	$1 \ll 1000000$	
$\gg$	से अधिक ज्यादा	much greater than	much greater than	$1000000 \gg 1$	
()		parentheses	calculate expression inside first	$2 * (3+5) = 16$	
[]		brackets	calculate expression inside first	^[2] = 18	
{ }		braces	set		
$\lfloor x \rfloor$	फर्श कोष्ठक	floor brackets	rounds number to lower integer	$\lfloor 4.3 \rfloor = 4$	
$\lceil x \rceil$	छत कोष्ठक	ceiling brackets	rounds number to upper integer	$\lceil 4.3 \rceil = 5$	
x!	विस्मयादिबोधक चिह्न	exclamation mark	factorial	$4! = 1*2*3*4 = 24$	
$\text{delim}\{\}\{x\}\{\}$	लंबवत सलाखों	vertical bars	absolute value	FALSE	
f (x)		function of x	maps values of x to f(x)	$f(x) = 3x+5$	
(f ◦ g)		function composition	$(f \circ g)(x) = f(g(x))$	$f(x)=3x, g(x)=x-1 \Rightarrow (f \circ g)(x)=3(x-1)$	
(a,b)	खुला अंतराल	open interval	$\langle m \rangle (a,b) = \{x$	$a < x < b \} \langle /m \rangle$	$x \in (2,6)$
[a,b]	बंद अंतराल	closed interval	$\langle m \rangle [a,b] = \{x$	$a \leq x \leq b \} \langle /m \rangle$	$x \in [2,6]$
Δ	बदलाव चिन्ह	delta	change / difference	$\Delta t = t_1 - t_0$	
Δ		discriminant	$\Delta = b^2 - 4ac$		
Σ		sigma	summation - sum of all values in range of series	$\sum x_i = x_1 + x_2 + \dots + x_n$	
$\Sigma\Sigma$		sigma	double summation		
Π		capital pi	product - product of all values in range of series	$\prod x_i = x_1 \cdot x_2 \cdot \dots \cdot x_n$	
e		e constant / Euler's number	$e = 2.718281828\dots$	$e = \lim (1+1/x)^x, x \rightarrow \infty$	

Mantrakshar	Hindi	Symbol Name	Meaning / definition	Example	
γ		Euler-Mascheroni constant	$\gamma = 0.5772156649...$		
ϕ	सुनहरा अनुपात	golden ratio	golden ratio constant		
π		pi constant	$\pi = 3.141592654...$ is the ratio between the circumference and diameter of a circle	$c = \pi \cdot d = 2 \cdot \pi \cdot r$	

LINEAR Algebra symbols

hindi	Symbol	Symbol Name	Meaning / definition	Example
	$\cdot$	dot	scalar product	$a \cdot b$
	$\times$	cross	vector product	$a \times b$
	$A \otimes B$	tensor product	tensor product of A and B	$A \otimes B$
	$\langle x, y \rangle$	inner product		
	$[]$	brackets	matrix of numbers	
	$()$	parentheses	matrix of numbers	
	A	determinant	determinant of matrix A	
	$\det(A)$	determinant	determinant of matrix A	
	$\ x\ $	double vertical bars	norm	
	A^T	transpose	matrix transpose	$(A^T)_{ij} = (A)_{ji}$
	$A^\dagger$	Hermitian matrix	matrix conjugate transpose	$(A^\dagger)_{ij} = (A)_{ji}$
	A^*	Hermitian matrix	matrix conjugate transpose	$(A^*)_{ij} = (A)_{ji}$
	A^{-1}	inverse matrix	$AA^{-1} = I$	
	$\text{rank}(A)$	matrix rank	rank of matrix A	$\text{rank}(A) = 3$
	$\dim(U)$	dimension	dimension of matrix A	$\dim(U) = 3$

Probability and statistics symbols

MANTRAKSHAR	HINDI	Symbol Name	Meaning / definition	Example
$P(A)$	प्रायिकता या संभाव्यता फलन	probability function	probability of event A	$P(A) = 0.5$
$P(A \cap B)$		probability of events intersection	probability that of events A and B	$P(A \cap B) = 0.5$
$P(A \cup B)$		probability of events union	probability that of events A or B	$P(A \cup B) = 0.5$
$\{P(A \text{ vert } B)\}$		conditional probability function	probability of event A given event B occurred	$P(A \cdot B) = 0.3$
$f(x)$		probability density function (pdf)	$P(a \leq x \leq b) = \int_a^b f(x) dx$	

MANTRAKSHAR	HINDI	Symbol Name	Meaning / definition	Example
$F(x)$		cumulative distribution function (cdf)	$F(x) = P(X \leq x)$	
μ	आबादी माध्य	population mean	mean of population values	$\mu = 10$
$E(X)$		expectation value	expected value of random variable X	$E(X) = 10$
$E(X Y)$		conditional expectation	expected value of random variable X given Y	$E(X Y=2) = 5$
$\text{var}(X)$	प्रसरण	variance	variance of random variable X	$\text{var}(X) = 4$
σ^2	प्रसरण	variance	variance of population values	$\sigma^2 = 4$
$\text{std}(X)$	मानक विचलन	standard deviation	standard deviation of random variable X	$\text{std}(X) = 2$
σ_X	मानक विचलन	standard deviation	standard deviation value of random variable X	$\sigma_X = 2$
		median	middle value of random variable X	
$\text{cov}(X,Y)$	सहप्रसरण	covariance	covariance of random variables X and Y	$\text{cov}(X,Y) = 4$
$\text{corr}(X,Y)$		correlation	correlation of random variables X and Y	$\text{corr}(X,Y) = 0.6$
$\rho_{X,Y}$		correlation	correlation of random variables X and Y	$\rho_{X,Y} = 0.6$
Σ	संकलन	summation	summation - sum of all values in range of series	
$\Sigma\Sigma$		double summation	double summation	
M_o	बहुलक	mode	value that occurs most frequently in population	
MR		mid-range	$MR = (x_{\max} + x_{\min})/2$	
M_d		sample median	half the population is below this value	
Q_1		lower / first quartile	25% of population are below this value	
Q_2		median / second quartile	50% of population are below this value = median of samples	
Q_3		upper / third quartile	75% of population are below this value	
$\bar{x}$		sample mean	average / arithmetic mean	$\bar{x} = (2+5+9)/3 = 5.333$
s^2		sample variance	population samples variance estimator	$s^2 = 4$
s		sample standard deviation	population samples standard deviation estimator	$s = 2$
z_x		standard score	$z_x = (x - \bar{x}) / s_x$	
$X \sim$		distribution of X	distribution of random variable X	$X \sim N(0,3)$
$N(\mu, \sigma^2)$	प्रसामान्य बंटन	normal distribution	gaussian distribution	$X \sim N(0,3)$
$U(a,b)$		uniform distribution	equal probability in range a,b	$X \sim U(0,3)$
$\exp(\lambda)$		exponential distribution	$f(x) = \lambda e^{-\lambda x}, x \geq 0$	
$\text{gamma}(c, \lambda)$		gamma distribution	$f(x) = \lambda^c x^{c-1} e^{-\lambda x} / \Gamma(c), x \geq 0$	

MANTRAKSHAR	HINDI	Symbol Name	Meaning / definition	Example
$\chi^2(k)$		chi-square distribution	$f(x) = \frac{x^{k/2-1}e^{-x/2}}{(2k/2) \Gamma(k/2)}$	
$F(k_1, k_2)$		F distribution		
$\text{Bin}(n, p)$		binomial distribution	$f(k) = nCk p^k(1-p)^{n-k}$	
$\text{Poisson}(\lambda)$		Poisson distribution	$f(k) = \frac{\lambda^k e^{-\lambda}}{k!}$	
$\text{Geom}(p)$		geometric distribution	$f(k) = p(1-p)^{k-1}$	
$\text{HG}(N, K, n)$		hyper-geometric distribution		
$\text{Bern}(p)$		Bernoulli distribution		

Combinatorics Symbols

HINDI	symbol	Symbol Name	Meaning / definition	Example
	$n!$	factorial	$n! = 1 \cdot 2 \cdot 3 \cdot \dots \cdot n$	$5! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 = 120$
	nPk	permutation	${}_nP_k = \frac{n!}{(n-k)!}$	$5P_3 = 5! / (5-3)! = 60$
	nCk	combination	${}_nC_k = \binom{n}{k} = \frac{n!}{k!(n-k)!}$	$5C_3 = 5! / [3!(5-3)!] = 10$

set theory symbols

Hindi	Symbol	Symbol Name	Meaning / definition	Example
	$\{ \}$	set	a collection of elements	$A = \{3, 7, 9, 14\}$, $B = \{9, 14, 28\}$
	$A \cap B$	intersection	objects that belong to set A and set B	$A \cap B = \{9, 14\}$
	$A \cup B$	union	objects that belong to set A or set B	$A \cup B = \{3, 7, 9, 14, 28\}$
	$A \subseteq B$	subset	A is a subset of B. set A is included in set B.	$\{9, 14, 28\} \subseteq \{9, 14, 28\}$
	$A \subset B$	proper subset / strict subset	A is a subset of B, but A is not equal to B.	$\{9, 14\} \subset \{9, 14, 28\}$
	$A \not\subseteq B$	not subset	set A is not a subset of set B	$\{9, 66\} \not\subseteq \{9, 14, 28\}$
	$A \supseteq B$	superset	A is a superset of B. set A includes set B	$\{9, 14, 28\} \supseteq \{9, 14, 28\}$
	$A \supset B$	proper superset / strict superset	A is a superset of B, but B is not equal to A.	$\{9, 14, 28\} \supset \{9, 14\}$
	$A \not\supseteq B$	not superset	set A is not a superset of set B	$\{9, 14, 28\} \not\supseteq \{9, 66\}$
	$2A$	power set	all subsets of A	
	$\mathcal{P}(A)$	power set	all subsets of A	
	$A = B$	equality	both sets have the same members	$A = \{3, 9, 14\}$, $B = \{3, 9, 14\}$, $A=B$
	A^c	complement	all the objects that do not belong to set A	
	$A \setminus B$	relative complement	objects that belong to A and not to B	$A = \{3, 9, 14\}$, $B = \{1, 2, 3\}$, $A-B = \{9, 14\}$
	$A - B$	relative complement	objects that belong to A and not to B	$A = \{3, 9, 14\}$, $B = \{1, 2, 3\}$, $A-B = \{9, 14\}$

Hindi	Symbol	Symbol Name	Meaning / definition	Example
	$A \Delta B$	symmetric difference	objects that belong to A or B but not to their intersection	$A = \{3,9,14\}, B = \{1,2,3\}, A \Delta B = \{1,2,9,14\}$
	$A \ominus B$	symmetric difference	objects that belong to A or B but not to their intersection	$A = \{3,9,14\}, B = \{1,2,3\}, A \ominus B = \{1,2,9,14\}$
	$a \in A$	element of , belongs to	set membership	$A = \{3,9,14\}, 3 \in A$
	$x \notin A$	not element of	no set membership	$A = \{3,9,14\}, 1 \notin A$
	(a,b)	ordered pair	collection of 2 elements	
	$A \times B$	cartesian product	set of all ordered pairs from A and B	$A \times B = \{(a,b) \mid a \in A, b \in B\}$
	$ A $	cardinality	the number of elements of set A	$A = \{3,9,14\}, A = 3$
	$\#A$	cardinality	the number of elements of set A	$A = \{3,9,14\}, \#A = 3$
	$\square$	vertical bar	such that	$A = \{x \mid 3 < x < 14\}$
		aleph-null	infinite cardinality of natural numbers set	
		aleph-one	cardinality of countable ordinal numbers set	
	$\emptyset$	empty set	$\emptyset = \{ \}$	$C = \{\emptyset\}$
	U	universal set	set of all possible values	
	$\mathbb{N}_0$	natural numbers / whole numbers set (with zero)	$\mathbb{N}_0 = \{0,1,2,3,4,\dots\}$	$0 \in \mathbb{N}_0$
	$\mathbb{N}_1$	natural numbers / whole numbers set (without zero)	$\mathbb{N}_1 = \{1,2,3,4,5,\dots\}$	$6 \in \mathbb{N}_1$
	$\mathbb{Z}$	integer numbers set	$\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$	$-6 \in \mathbb{Z}$
	$\mathbb{Q}$	rational numbers set	$\mathbb{Q} = \{x \mid x = a/b, a, b \in \mathbb{Z}\}$	$2/6 \in \mathbb{Q}$
	$\mathbb{R}$	real numbers set	$\mathbb{R} = \{x \mid -\infty < x < \infty\}$	$6.343434 \in \mathbb{R}$
	$\mathbb{C}$	complex numbers set	$\mathbb{C} = \{z \mid z = a+bi, -\infty < a < \infty, -\infty < b < \infty\}$	$6+2i \in \mathbb{C}$

logic symbols

Hindi	Symbol	Symbol Name	Meaning / definition	Example
	$\cdot$	and	and	$x \cdot y$
		caret / circumflex	and	$\$ x^y \$$
	$\&$	ampersand	and	$x \& y$
	$+$	plus	or	$x + y$
	$\vee$	reversed caret	or	$x \vee y$

Hindi	Symbol	Symbol Name	Meaning / definition	Example
	⊥	vertical line	or	$x ⊥ y$
	x'	single quote	not - negation	x'
	x	bar	not - negation	$\bar{x}$
	¬	not	not - negation	$¬ x$
	!	exclamation mark	not - negation	$! x$
	⊕	circled plus / oplus	exclusive or - xor	$x ⊕ y$
	~	tilde	negation	$\sim x$
	⇒	implies		
	⇔	equivalent	if and only if (iff)	
	↔	equivalent	if and only if (iff)	
	∀	for all		
	∃	there exists		
	∄	there does not exists		
	∴	therefore		
	∵	because / since		

calculus and analysis symbols

HINDI	Symbol	Symbol Name	Meaning / definition	Example		
	$\lim_{x \rightarrow x_0} f(x)$	limit	limit value of a function			
	ϵ	epsilon	represents a very small number, near zero	$\epsilon \rightarrow 0$		
	e	e constant / Euler's number	e = 2.718281828...	$e = \lim_{x \rightarrow \infty} (1 + 1/x)^x$		
	y'	derivative	derivative - Lagrange's notation	$(3 \times 3)' = 9 \times 2$		
	<m>y</m> second derivative derivative of derivative $(3 \times 3) = 18x$					
	y(n)	nth derivative	n times derivation	$(3 \times 3)(3) = 18$		
	<m>dy/dx</m>	derivative	derivative - Leibniz's notation	$d(3 \times 3)/dx = 9 \times 2$		
	<m>d	2y/dx	2</m>	second derivative	derivative of derivative	$d^2(3 \times 3)/dx^2 = 18x$
	<m>d	ny/dx	n</m>	nth derivative	n times derivation	
	$\dot{y}$	time derivative	derivative by time - Newton's notation			
		time second derivative	derivative of derivative			
	Dx y	derivative	derivative - Euler's notation			
	Dx2y	second derivative	derivative of derivative			
	<m>detaf(x,y)/deltax</m>	partial derivative		$\partial(x^2 + y^2)/\partial x = 2x$		

HINDI	Symbol	Symbol Name	Meaning / definition	Example		
	$\int$	integral	opposite to derivation	$\int f(x)dx$		
	$\iint$	double integral	integration of function of 2 variables	$\iint f(x,y)dxdy$		
	$\iiint$	triple integral	integration of function of 3 variables	$\iiint f(x,y,z)dxdydz$		
	$\oint$	closed contour / line integral				
	$\oiint$	closed surface integral				
	$\oiint$	closed volume integral				
	$[a,b]$	closed interval	$[a,b] = \{x \mid a \leq x \leq b\}$			
	(a,b)	open interval	$(a,b) = \{x \mid a < x < b\}$			
	i	imaginary unit	$i \equiv \sqrt{-1}$	$z = 3 + 2i$		
	z^*	complex conjugate	$z = a+bi \rightarrow z^*=a-bi$	$z^* = 3 - 2i$		
	$\bar{z}$	complex conjugate	$z = a+bi \rightarrow \bar{z} = a-bi$	$\bar{z} = 3 - 2i$		
	$\text{Re}(z)$	real part of a complex number	$z = a+bi \rightarrow \text{Re}(z)=a$	$\text{Re}(3 - 2i) = 3$		
	$\text{Im}(z)$	imaginary part of a complex number	$z = a+bi \rightarrow \text{Im}(z)=b$	$\text{Im}(3 - 2i) = -2$		
	$ z $	absolute value/magnitude of a complex number	$ z = a+bi = \sqrt{a^2+b^2}$	$ 3 - 2i = \sqrt{13}$		
	$\arg(z)$	argument of a complex number	The angle of the radius in the complex plane	$\arg(3 + 2i) = 33.7^\circ$		
	∇	nabla / del	gradient / divergence operator	$\nabla f(x,y,z)$		
		vector				
		unit vector				
	$x * y$	convolution	$y(t) = x(t) * h(t)$			
		Laplace transform	$F(s) = \{f(t)\}$			
		Fourier transform	$X(\omega) = \{f(t)\}$			
	δ	delta function				
	∞	lemniscate	infinity symbol			

1) $1+2 \times (1+5)$

2) $(1+2) \times (1+5)$

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