BAAP OF ALL FORMULA LISTS

FOR IIT JEE

VECTORS

SL#	FORMULA
1	**Unit Vectors,** $\vec{i}=(1,0,0), \vec{j}=(0,1,0), \vec{k}=(0,0,1), \left\|\vec{i}\right\|\left\|\vec{j}\right\|=\left\|\vec{k}\right\|=1,$
2	$\vec{r}=\overrightarrow{AB}=(x_1-x_0)\vec{i}+(y_1-y_0)\vec{j}+(z_1-z_0)\vec{k}$
3	$\left\|\vec{r}\right\|=\left\|\overrightarrow{AB}\right\|=\sqrt{(x_1-x_0)^2+(y_1-y_0)^2+(z_1-z_0)^2}$
4	**If** $\overrightarrow{AB}=\vec{r}, then \overrightarrow{BA}=-\vec{r}$.
5	$X=\left\|\vec{r}\right\|\cos\alpha, Y=\left\|\vec{r}\right\|\cos\beta, Z=\left\|\vec{r}\right\|\cos\gamma$
6	**If** $\vec{r}(X,Y,Z)=\vec{r}_1(X_1,Y_1,Z_1)$, **then** $X=X_1, Y=Y_1, Z-Z_1$
7	$\vec{w}=\vec{u}+\vec{v}$
8	$\vec{w}=\vec{u}_1+\vec{u}_2+\vec{u}_3+\ldots\ldots\ldots+\vec{u}_m$
9	**Cummutative Law** $\vec{u}+\vec{v}=\vec{v}+\vec{u}$
10	**Associative Law** $\left(\vec{u}+\vec{v}\right)+\vec{w}=\vec{u}\left(\vec{v}+\vec{w}\right)$
11	$\vec{u}+\vec{v}=(X_1+X_2, Y_1+Y_2, Z_1+Z_2)$
12	$\vec{w}=\vec{u}-\vec{v}\quad \text{if}\quad \vec{c}+\vec{w}=\vec{u}$
13	$\vec{u}-\vec{v}=\vec{u}+\left(=\vec{c}\right)$
14	$\vec{u}-\vec{u}=\vec{0}=(0,0,0)$
15	

	$\left\|\overrightarrow{0}\right\| = 0$
doubtnut पढ़ना हुआ आसान	
16	$\overrightarrow{u} - \overrightarrow{v} = (X_1 - X_2, Y_1 - Y_2, Z_1 - Z_2)$
17	$\overrightarrow{w} = \lambda\overrightarrow{u}$
18	$\left\|\overrightarrow{w}\right\| = \|\lambda\|.\left\|\overrightarrow{u}\right\|$
19	$\lambda\overrightarrow{u} = (\lambda X, \lambda Y, \lambda Z)$
20	$(\lambda + \mu)\overrightarrow{u} = \lambda\overrightarrow{u} + \mu\overrightarrow{u}$
21	$\lambda\left(\mu\overrightarrow{u}\right) = \mu\left(\lambda\overrightarrow{u}\right) = (\lambda\mu)\overrightarrow{u}$
22	$\lambda\left(\overrightarrow{u} + \overrightarrow{v}\right) = \lambda\overrightarrow{u} + \lambda\overrightarrow{v}$
23	**Scalar Product of Vectors** $\overrightarrow{u} \text{ and } \overrightarrow{v}\overrightarrow{u}.\overrightarrow{v} = \left\|\overrightarrow{u}\right\|.\left\|\overrightarrow{v}\right\|.\cos\theta,$ **where θ is the angle betwewen vectors $\overrightarrow{u}$ and $\overrightarrow{v}$.**
doubtnut पढ़ना हुआ आसान	
24	**Scalar Product in Coordinate Form** **If** $\overrightarrow{u} = (X_1, Y_1, Z_1) = \overrightarrow{v} = (X_2, Y_2, Z_2)$ **then** $\overrightarrow{u}.\overrightarrow{v} = X_1X_2 + Y_1Y_2 + Z_1Z_2.$
25	**Angle Between Two vectors** **If** $\overrightarrow{u} = (X_1, Y_1, Z_1), \overrightarrow{v} = (X_2, Y_2, Z_2),$ **then** $\cos\theta = \frac{X_1X_2 + Y_1Y_2 + Z_1 + Z_2}{\sqrt{X_1^2 + Y_1^2 + Z_1^2}\sqrt{X_2^2 + Y_2^2 + Z_2^2}}$
26	**Commutative Property** $\overrightarrow{u}.\overrightarrow{v} = \overrightarrow{v}.\overrightarrow{u}$
27	**Associative Property** $\left(\lambda\overrightarrow{u}\right).\left(\mu\overrightarrow{v}\right) = \lambda\mu\overrightarrow{u}.\overrightarrow{v}$
28	**Distributive Property** $\overrightarrow{u}.\left(\overrightarrow{v} + \overrightarrow{w}\right) = \overrightarrow{u}.\overrightarrow{v} + \overrightarrow{u}.\overrightarrow{w}$
29	$\overrightarrow{u}.\overrightarrow{v} = 0 \text{ if } \overrightarrow{u}, \overrightarrow{v}$ **are orthogonal** $\left(\theta = \frac{\pi}{2}\right)$

30	$\vec{u}.\vec{v} > 0$ if $0 < \theta < \frac{\pi}{2}$
31	$\vec{u}.\vec{v} < 0$ if $\frac{\pi}{2} < \theta < \pi$
32	$\vec{u}.\vec{v} \leq \lvert\vec{u}\rvert.\lvert\vec{v}\rvert$
33	$veu.\vec{v} = \lvert\vec{u}\rvert.\lvert\vec{v}\rvert$ if $\vec{u}, \vec{v}$ are parallel $(\theta = 0)$
34	If $\vec{u} = (X_1, Y_1, Z_1)$, then $\vec{u}.\vec{u} = \vec{u}^2 = \lvert\vec{u}\rvert^2 = X_1^2 + Y_1^2 + Z_1^2$
35	$\vec{i}.\vec{i} = \vec{j}.\vec{j} = \vec{k}.\vec{k} = 1$
36	$\vec{i}.\vec{j} = \vec{j}.\vec{k} = \vec{k}.\vec{k} = 0$
37	**Vector Product of Vectos** $\vec{u}$ and $\vec{c}\ \overrightarrow{\times}\ \vec{v} = \vec{w}$, where, $\lvert\vec{w}\rvert = \lvert\vec{u}\rvert.\lvert\vec{v}\rvert.\sin\theta$, where $0 \leq \theta \leq \frac{\pi}{2}$, $\vec{w} \perp \vec{u}$ and $\vec{w} \perp \vec{v}$; Vectors $\vec{u}, \vec{v}, \vec{w}$ form a right handed scerew.
38	$\vec{w} = \vec{u} \times \vec{v} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ X_1 & Y_1 & Z_1 \\ X_2 & Y_2 & Z_2 \end{vmatrix}$
39	$\vec{w} = \vec{u} \times \vec{c} = \left(\begin{vmatrix} Y_1 & Z_1 \\ Y_2 & Z_2 \end{vmatrix}, -\begin{vmatrix} X_1 & Z_1 \\ X_2 & Z_2 \end{vmatrix}, \begin{vmatrix} X_1 & Y_1 \\ X_2 & Y_2 \end{vmatrix}\right)$
40	$S = \lvert\vec{u} \times \vec{v}\rvert = \lvert\vec{u}\rvert.\lvert\vec{v}\rvert.\sin\theta$
41	Angle Between Two Vectors $\sin\theta = \frac{\vec{u} + \vec{v}}{\lvert\vec{u}\rvert.\lvert\vec{v}\rvert}$
42	Noncommutative Property $\vec{u} \times \vec{v} = -(\vec{v} \times \vec{u})$

43	**Associative Property** $\left(\lambda\vec{u}\right) \times \left(\mu\vec{v}\right) = \lambda\vec{u} \times \vec{v}$
44	**Distributive Property** $\vec{u} \times \left(\vec{v} + \vec{w}\right) = \vec{u} \times \vec{v} + \vec{u} + \vec{w}$
45	$\vec{u} \times \vec{v} = \vec{0}$ **if** $\vec{u}$ **and** $\vec{c}$ **are parallel** $(\theta = 0)$
46	$\vec{i} \times \vec{x} = \vec{j} \times \vec{j} = \vec{k} \times \vec{k} = \vec{0}$
47	$\vec{i} \times \vec{x} = \vec{j} \times \vec{j} = \vec{k} \times \vec{k} = \vec{0}$
doubtnut पढ़ना हुआ आसान	
48	**Scalar Triple Product** $\left[\vec{u}\,\vec{v}\,\vec{w}\right] = \vec{u}.\left(\vec{v} \times \vec{w}\right) = \vec{v}.\left(\vec{w} \times \vec{u}\right) = \vec{w}.\left(\vec{u} \times \vec{v}\right)$
49	$\left[\vec{u}\,\vec{v}\,\vec{w}\right] = \left[\vec{w}\,\vec{u}\,\vec{v}\right] = \left[\vec{v}\,\vec{w}\,\vec{u}\right] = -\left[\vec{v}\,\vec{u}\,\vec{w}\right] = -\left[\vec{w}\,\vec{v}\,\vec{u}\right] = -\left[\vec{u}\,\vec{w}\,\vec{v}\right]$
50	$k\vec{u}.\left(\vec{v} \times \vec{w}\right) = k\left[\vec{u}\,\vec{v}\,\vec{w}\right]$
51	**Scalar Triple Product in Coordinate Form** $\vec{u}.\left(\vec{v} \times \vec{w}\right) = \begin{vmatrix} X_1 & Y_1 & Z_1 \\ X_2 & Y_2 & Z_2 \\ X_3 & Y_3 & Z_3 \end{vmatrix}$, **where** $\vec{u} = (X_1, Y_1, Z_1), \vec{v} = (X_2, Y_2, Z_2), \vec{w} = (X_3, Y_3, Z_3)$
52	**Volume of Parallelpiped** $V = \left\|\vec{u}.\left(\vec{v} \times \vec{w}\right)\right\|$
53	**Volume of Pyramid** $V = \frac{1}{6}\left\|\vec{u}.\left(\vec{v} \times \vec{w}\right)\right\|$
54	**If** $\vec{u}.\left(\vec{v} \times \vec{w}\right) = 0$, **then the vectors** $\vec{u}, \vec{v}$ **and** $\vec{w}$ **are linearly dependent so** $\vec{w} = \lambda\vec{u} + \mu\vec{v}$ **for some scalars** λ **and** μ
55	**If** $\vec{u}.\left(\vec{v} \times \vec{w}\right) \neq 0$, **then the vectors** $\vec{u}$, $\vec{v}$, **and** $\vec{w}$ **are linearly independent.**
doubtnut पढ़ना हुआ आसान	
56	**Vector Triple Product** $\vec{u} \times \left(\vec{v} \times \vec{w}\right) = \left(\vec{u}.\vec{w}\right)\vec{v} - \left(\vec{u}.\vec{v}\right)\vec{w}$
doubtnut पढ़ना हुआ आसान	