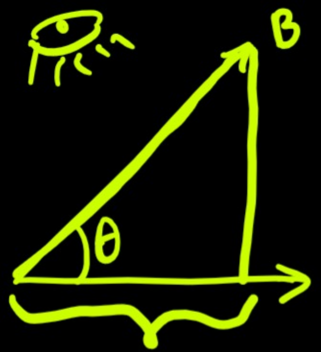
$\overset{6}{3} - \overset{8}{4} - \overset{10}{5}$

$7 - 24 - 25$

$5 - 12 - 13$



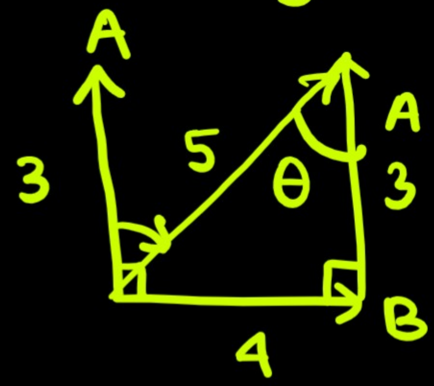
$$\vec{A} \cdot \vec{B} = AB\cos\theta$$

$$\Rightarrow B\cos\theta = \frac{\vec{A} \cdot \vec{B}}{A}$$

A এর দিকে B এর উপাংশ

অভিক্ষেপ

$\tan^{-1}\frac{4}{3}$



লব্ধি

QB → উদ্ভাস

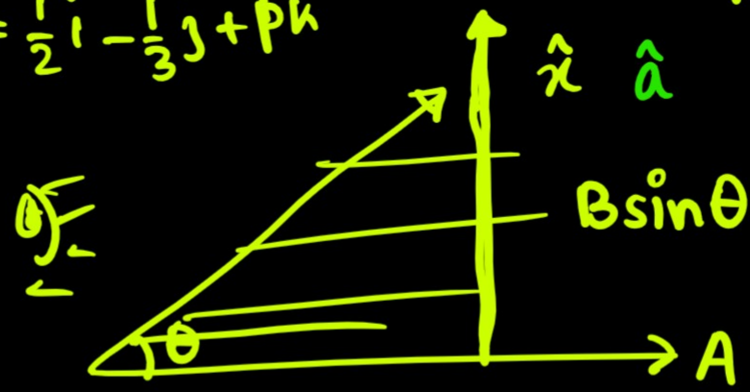
$\left(\frac{1}{2}\right)^2 + \left(\frac{1}{3}\right)^2 + p^2 = 1$

Vector → Point → Imaginery Number

$\vec{A} = (3, 2, 1)$

$\vec{B} = (1, 2, 3)$

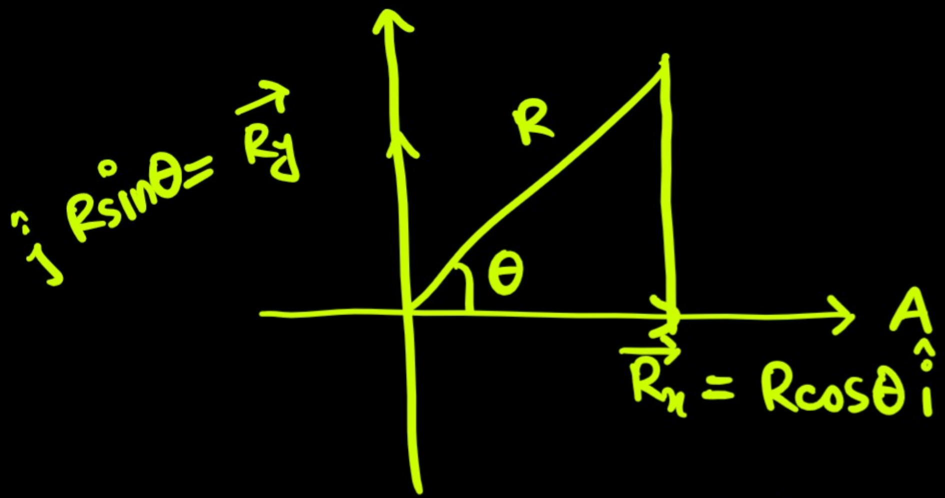
$\hat{a} = \frac{1}{2}\hat{i} - \frac{1}{3}\hat{j} + p\hat{k}$

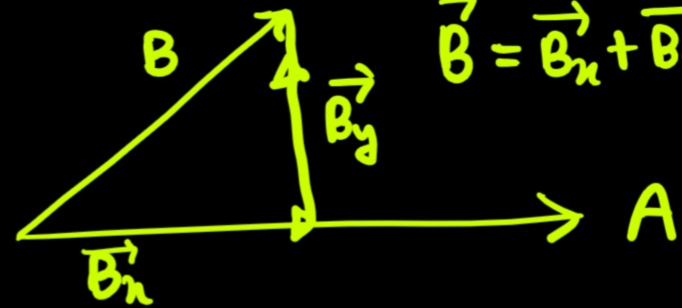


$\vec{A} \times \vec{B} = \hat{\eta} AB\sin\theta$

$B\sin\theta =$

$\frac{|\vec{A} \times \vec{B}|}{A} = B\sin\theta$





$$\vec{B} = \vec{B}_x + \vec{B}_y$$

$$\frac{\vec{A}}{A} = \hat{a}$$

$$\vec{B}_x = B\cos\theta\, \hat{a} = \frac{\vec{A}\cdot\vec{B}}{A}\,\frac{\vec{A}}{A} = \frac{(\vec{A}\cdot\vec{B})\,\vec{A}}{A^2}$$

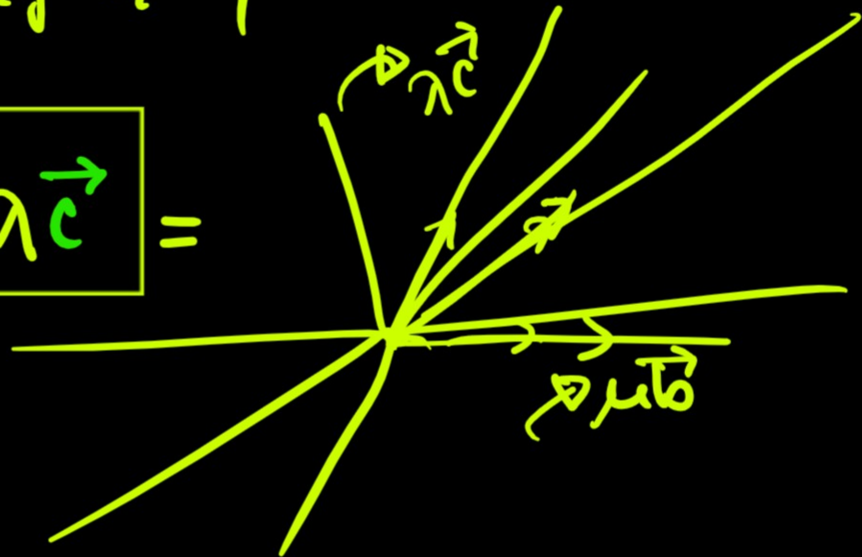
$$\vec{B}_y = \vec{B} - \vec{B}_x = \vec{B} - \frac{(\vec{A}\cdot\vec{B})\,\vec{A}}{A^2}$$

সমতলীয় :

$\Rightarrow \vec{A} \cdot (\vec{B} \times \vec{C}) = 0$

$$\begin{vmatrix} A_x & A_y & A_z \\ B_x & B_y & B_z \\ C_x & C_y & C_z \end{vmatrix} = 0$$

$$\boxed{\vec{a} = \mu\vec{b} + \lambda\vec{c}} =$$



$\vec{P} = \hat{i} + \hat{j} + \hat{k}$

$\vec{Q} =$

Biology → Test Paper

Shompod → English → Board

Bangla → Board

Revision

Youtube

ACS

ICT → Forhad Sir

Monjur

Solution

DU Ka

HSC

#Revision

→ Active Recall

→

→ রাতে 30 min

1 hr

MCQ

Shortcut

→ সকালে

আগের দিন

Brain

IIT → JEE

⇒ নিজের Shortcut

$\frac{1}{0!} + \frac{3}{1!} + \frac{5}{2!} + \frac{7}{3!} + \dots$

#PYQ → QB ['19–20]

$$= \sum_{n=0}^{\infty} \frac{2n+1}{n!}$$

$$= \sum_{n=0}^{\infty} \frac{2}{(n-1)!} + \sum_{n=0}^{\infty} \frac{1}{n!}$$

$$= (-1)! = \infty$$

$$= 0 + \sum_{k=0}^{\infty} \frac{2}{k!} + \sum_{n=0} \frac{1}{n!}$$

$k = n-1$

$$= 2\sum_{n=0}^{\infty} \frac{1}{n!} + \sum_{n=0}^{\infty} \frac{1}{n!}$$

$$= 2e + e = 3e$$

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

$$= \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

* $\ln(1-x) = -\sum_{n=0} \frac{x^{n+1}}{n+1}$
* $\ln(1+x) = -\sum \frac{(-1)^{n+1} x^{n+1}}{n+1}$

$$e^1 = \sum_{n=0}^{\infty} \frac{1}{n!}$$

পাই

$$\prod_{i=1}^{3}(2i) = 2\times 4\times 6 = 2^3(1\times 2\times 3)$$

$$= 2^3\prod_{i=1}^{3} i$$

সিগমা

$$\sum$$

$\frac{1}{1!} + \frac{5}{2!} + \frac{9}{3!} + \frac{13}{4!} + \dots \dots$

$0! = 1$

$ar^{n-1} = T_n$

$1! = 1$

$a + (n-1)d = T_n$

$1 + (n-1)4 = 4n - 3$

$$= \sum_{n=1}^{\infty} \frac{4n-3}{n!}$$

$$= \sum_{n=1}^{\infty} \frac{4}{(n-1)!} - \sum_{n=1}^{\infty} \frac{3}{n!}$$

$$\sum_{n=0}^{\infty} \frac{1}{n!} = e$$

$$\frac{1}{1} + \left(\sum_{n=1}^{\infty} \frac{1}{n!} \right) = e$$

$$= \sum_{k=0}^{\infty} \frac{4}{k!} - 3(e-1)$$

$$= 4e - 3e + 3 = e + 3$$

Practical KVET $\rightarrow$ Bisection $\longrightarrow$

Newton - Raphson $\longrightarrow$

BUET $\rightarrow$

$\#$ $\displaystyle\sum_{n=0}^{\infty} \frac{1}{n!} = e \qquad \sum_{n=0}^{\infty} \frac{n}{n!} = \sum_{n=0}^{\infty} \frac{1}{(n-1)!} = e$

$$\sum_{n=0}^{\infty} \frac{n^2}{n!} = 2e$$

$$e^x = \sum \left(\frac{x^n}{n!}\right) \qquad \frac{d}{dx}(g+f) = g' + f'$$

$$\frac{d}{dx}(e^x) = \sum \frac{d}{dx}\left(\frac{x^n}{n!}\right) \Rightarrow e^x = \sum_{n=0}^{\infty} \frac{\cancel{n}x^{n-1}}{\cancel{n}!\,(n-1)!}$$

$$e^{e^x} = \sum \frac{(e^x)^n}{n!}$$

$\vec{A} = 3\hat{i} + 5\hat{j}$ $\vec{B} = 3\hat{i} + 4\hat{j}$

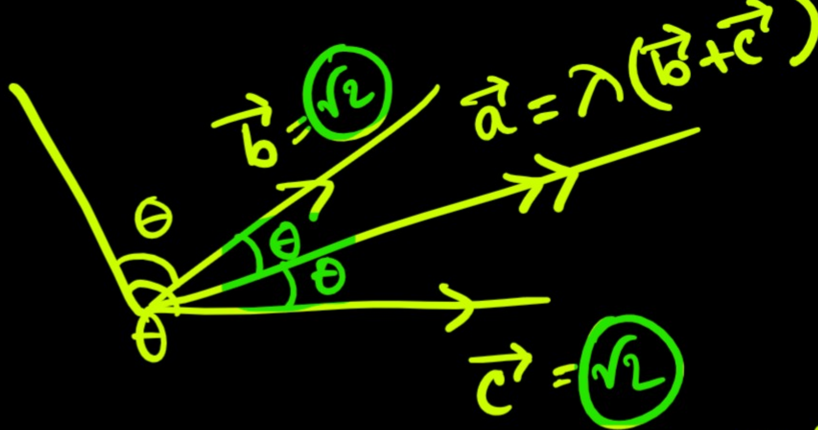
B এর লম্ব দিকে

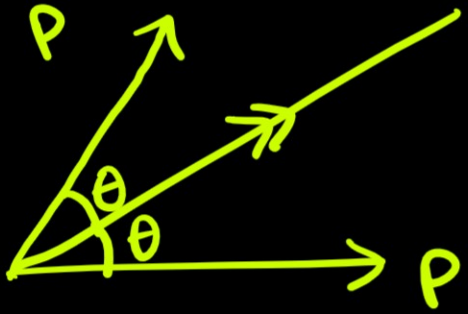
ভেক্টর $\vec{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}$

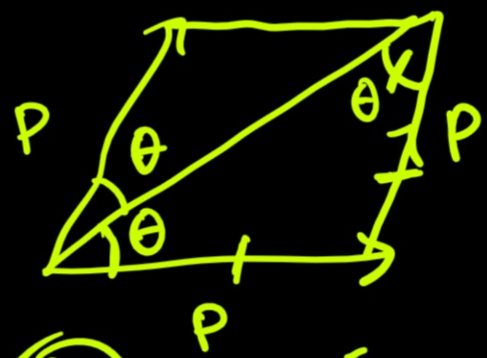
সমতলীয় "θ"

$b = \sqrt{2}$ $= \vec{b} = \hat{i} + \hat{j}$

$c = \sqrt{2}$ $\vec{c} = \hat{j} + \hat{k}$







জ্যামিতি

ম্যাথের প্রুফ

DU

$k = ?$

2 S 3

$\vec{a} + \vec{b} = \vec{c}$

$\vec{b} - \vec{c} = \vec{a}$

Trial & Error

$\vec{a} = \lambda(\vec{b} + \vec{c})$ $\quad \because b = c = \sqrt{2}$ & $\vec{a} \wedge \vec{b} = \vec{a} \wedge \vec{c}$

$\alpha\hat{i} + 2\hat{j} + \beta\hat{k} = \lambda\hat{i} + \underline{2\lambda}\hat{j} + \lambda\hat{k}$

$\left.\begin{array}{l} \lambda = 1 \\ \lambda = \alpha = \beta = 1 \end{array}\right\}$

কেতাব স্যার

প্রতিবিম্ব :

সাপেক্ষে

$\vec{a} - \vec{b}$

$\vec{A} = 3\hat{i} + 5\hat{j}$ $\quad$ $\vec{B} = 3\hat{i} + 4\hat{j}$

$\vec{B}$ এর লম্ব দিকে একই তলে

$\vec{A}$ এর উপাংশ $\left(\frac{x}{x+16}\right)\left(-\frac{4}{3}\hat{i}+\hat{j}\right)$ $\quad$ $\vec{B} - \vec{B}_n$

< 1 min

$1-2$ min

$$\frac{29}{\sqrt{34}} = (5\cos\theta) \Rightarrow (5\sin\theta) = \sqrt{5^2 - \left(\frac{29}{\sqrt{34}}\right)^2}$$

$$\left|k\left(x\hat{i}+y\hat{j}\right)\right| = \sqrt{(kx)^2+(ky)^2} = k\sqrt{(x^2+y^2)}$$

$$5\cos\theta = \frac{29}{\sqrt{34}}$$

$$(-x)^2 = x^2$$

$$(5\cos\theta)^2 + (5\sin\theta)^2 = 5^2$$

$$B\sin\theta = 5\sin\theta = \sqrt{5^2 - (5\cos\theta)^2} = \sqrt{5^2 - \frac{29^2}{34}} =$$

$$B\sin\theta = \sqrt{5^2 - \frac{29^2}{34}} = \frac{x}{x+16}\sqrt{\left(\frac{4}{3}\right)^2 + 1^2}$$

$$\sqrt{5^2 - \frac{29^2}{34}} = \frac{5}{3}\,\frac{x}{x+16}$$

$$\boxed{-2, 3}$$

$$\Rightarrow x = 7.14 = \frac{714}{100}$$

$\vec{A}\cdot\vec{A} = A^2 = |A|^2$

$$= \frac{(\vec{A}-\vec{B})\cdot\vec{B}}{|\vec{A}-\vec{B}|} = \frac{\overset{=3}{\vec{A}\cdot\vec{B}} - B^2}{|\vec{A}-\vec{B}|}$$

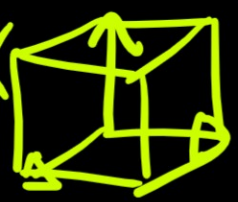
<u>HW</u>

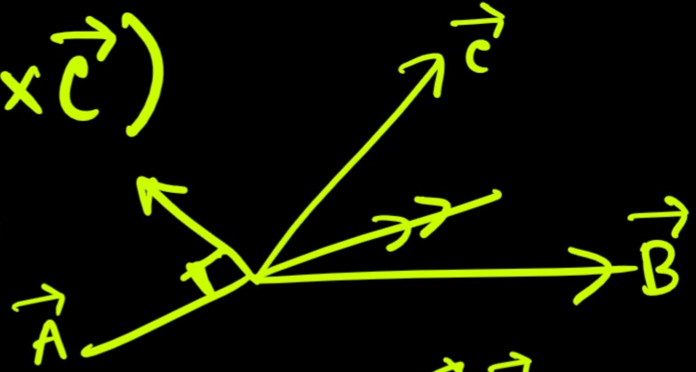
$\vec{A}\times\vec{B} = 2\hat{i} - \hat{k}$

$(\hat{i} - \hat{j} + 2\hat{k})\times\vec{B} = (2\hat{i} - \hat{k})$

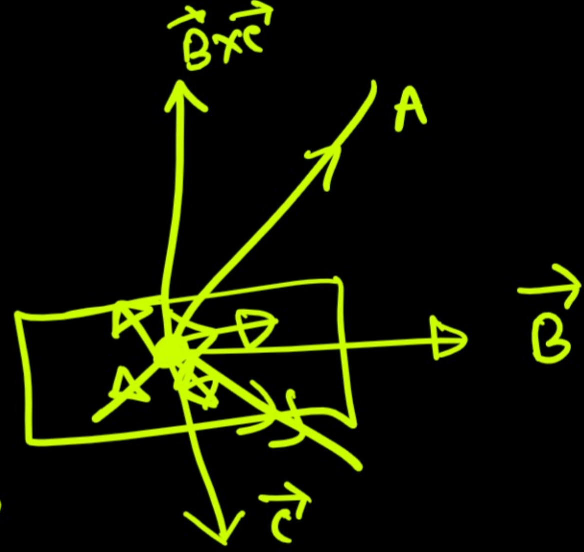
$\vec{B} = B_x\hat{i} + B_y\hat{j} + B_z\hat{k}$

Scalar Triple Product $\vec{A}\cdot(\vec{B}\times\vec{C})$

$\vec{A}\cdot(\vec{B}\cdot\vec{C})$  $=$ Volume



Vector Triple Product $\vec{A}\times(\vec{B}\times\vec{C})$



$$\underline{\vec{A}}\times(\underline{\vec{B}\times\vec{C}}) = \lambda\vec{B}+\mu\vec{C}$$

$$\vec{A}\cdot(\underbrace{\vec{A}\times(\vec{B}\times\vec{C})}) = \lambda\vec{A}\cdot\vec{B}+\mu\vec{A}\cdot\vec{C}$$

লম্ব

$$0 = \lambda\vec{A}\cdot\vec{B}+\mu\vec{A}\cdot\vec{C}$$

$$\lambda\vec{A}\cdot\vec{B} = -\mu\vec{A}\cdot\vec{C}$$

$$\sum \lambda_i \vec{a_i} = \vec{0}$$

$$\vec{A} \times (\vec{B} \times \vec{C}) = (\lambda \vec{B} + \mu \vec{C})$$

$\hat{i}$ $\hat{j} \times \hat{k}$

λ μ

$\hat{i} + \hat{j}$ $\vec{B} = \hat{j}$

$$\vec{A} \cdot (\vec{A} \times (\vec{B} \times \vec{C})) = \lambda \vec{A} \cdot \vec{B} + \mu \vec{A} \cdot \vec{C} =$$

$$0 = \lambda \vec{A} \cdot \vec{B} + \mu \vec{A} \cdot \vec{C}$$

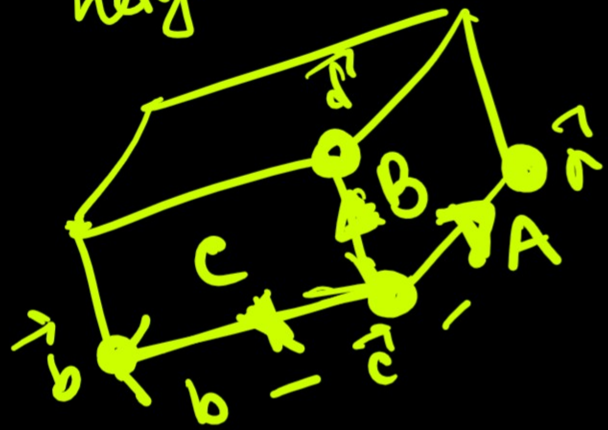
$$\boxed{\lambda \vec{A} \cdot \vec{B} = -\mu \vec{A} \cdot \vec{C}} \Rightarrow 0 = 0$$

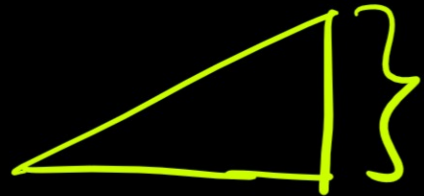
$\hat{i} \cdot \hat{j}$ $\hat{j} \cdot \hat{k}$

$\hat{i}$ $\hat{j}$ k

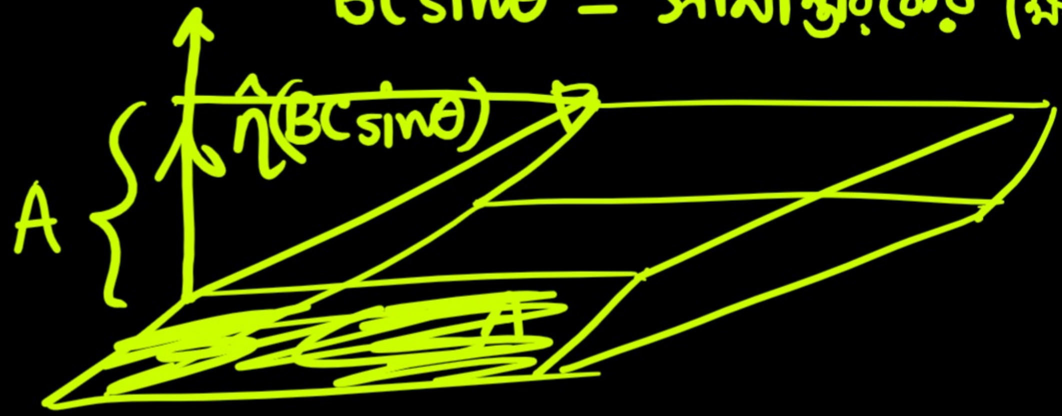
a

$$\underset{\text{height}}{\vec{A}} \cdot (\underbrace{\vec{B}\times\vec{C}}_{\text{Area}})$$





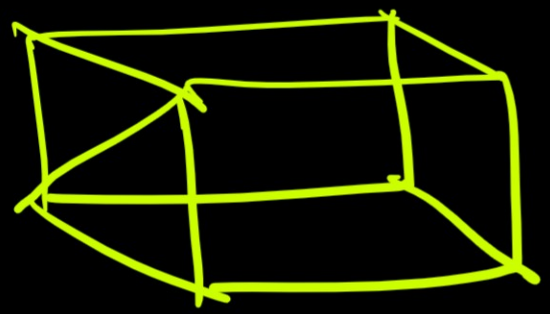
$BC\sin\theta$ = সামান্তরিকের ক্ষেত্রফল



$$\underline{\vec{A}} \cdot (\underline{\vec{B}} \times \underline{\vec{C}}) = \text{Volume}$$

Tetrahedron (চতুস্তলক)

$$\to \frac{1}{6}\left[\vec{A}\ \vec{B}\ \vec{C}\right] = \frac{1}{6}\,\vec{A}\cdot\left(\vec{B}\times\vec{C}\right)$$



$$\vec{A} \times (\vec{B} \times \vec{C}) = \lambda \vec{B} + \mu \vec{C} = k(-\underbrace{\vec{A} \cdot \vec{C}}_{0})\vec{B} + (\underbrace{\vec{A} \cdot \vec{B}}_{0})k\vec{C}$$

$$\vec{0} = \vec{0}$$

$$\vec{A} \cdot \longrightarrow \lambda \vec{A} \cdot \vec{B} = -\mu \vec{A} \cdot \vec{C}$$

$k(-\vec{A} \cdot \vec{C})$ $(\vec{A} \cdot \vec{B}\, k)$

$k(-\vec{A} \cdot \vec{C})$

$$\boxed{T \,\&\, E}$$

$$-k(\vec{A} \cdot \vec{C})(\vec{A} \cdot \vec{B}) = -k(\vec{A} \cdot \vec{C})(\vec{A} \cdot \vec{B})$$

$$2\overset{=3}{m} = 3\,n^{=2}$$

$$\vec{A} \times (\vec{B} \times \vec{C}) = \lambda \vec{B} + \mu \vec{C} \quad *$$

Stop Watch

- use -
-

$$\vec{A} \cdot (\vec{A} \times (\vec{B} \times \vec{C})) = \lambda \vec{A} \cdot \vec{B} + \mu \vec{A} \cdot \vec{C} = 0$$

$$\lambda \vec{A} \cdot \vec{B} = -\mu \vec{A} \cdot \vec{C}$$

$$k(\vec{A} \cdot \vec{C}) \qquad (-k\vec{A} \cdot \vec{B})$$

$(\hat{i} + \hat{j})$ $\quad \hat{k}$ $\quad \hat{j}$

$$\vec{A} \times (\vec{B} \times \vec{C}) = k(\vec{A} \cdot \vec{C})\vec{B} - k(\vec{A} \cdot \vec{B})\vec{C}$$

$$(\hat{i} + \hat{j}) \times (-\hat{i}) = k(1)\hat{k}$$

$$\hat{k} = k\hat{k} \qquad k = 1$$

$\hat{i}$ $\quad \hat{j}$ $\quad \hat{k}$

$$\vec{A} \times (\vec{B} \times \vec{C}) = (\vec{A} \cdot \vec{C})\,\vec{B} - (\vec{A} \cdot \vec{B})\,\vec{C}$$

$$= \vec{B}\,(\vec{A} \cdot \vec{C}) - \vec{C}\,(\vec{A} \cdot \vec{B})$$

$$\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$$

BAC − CAB

$$(\vec{B} \times \vec{C}) \times \vec{A} = -\vec{A} \times (\vec{B} \times \vec{C})$$

$$\vec{A} \times (\vec{A} \times \vec{B}) =$$

$$\vec{A} \times (2\hat{i} - \hat{k}) = \vec{A}(\vec{A} \cdot \vec{B}) - \vec{B}(\underline{\vec{A} \cdot \vec{A}})$$

$$(\quad\underline{\hspace{3cm}}\quad) = 3\underline{\vec{A}} - \underline{A}^2 \vec{B}$$

$$\vec{B} = \frac{3\vec{A} - (\quad)}{A^2}$$

$$(\vec{A}-\vec{B}) . \vec{B}$$

$\vec{B}$

$$\vec{v} = \frac{d\vec{x}}{dt}\Big|_{t=2} =$$

$$\vec{a} = \frac{d\vec{v}}{dt} = \frac{d^2\vec{x}}{dt^2}\Big|_{t=2} =$$

$$= \frac{\vec{v}\cdot\vec{a}}{|v|}$$

function $\longrightarrow f_{max/min} \Rightarrow \frac{df}{dx} = 0$

$${}_1\mu_2 = \frac{\mu_2}{\mu_1} = 2 \qquad \mu_2 = 2\mu_1$$

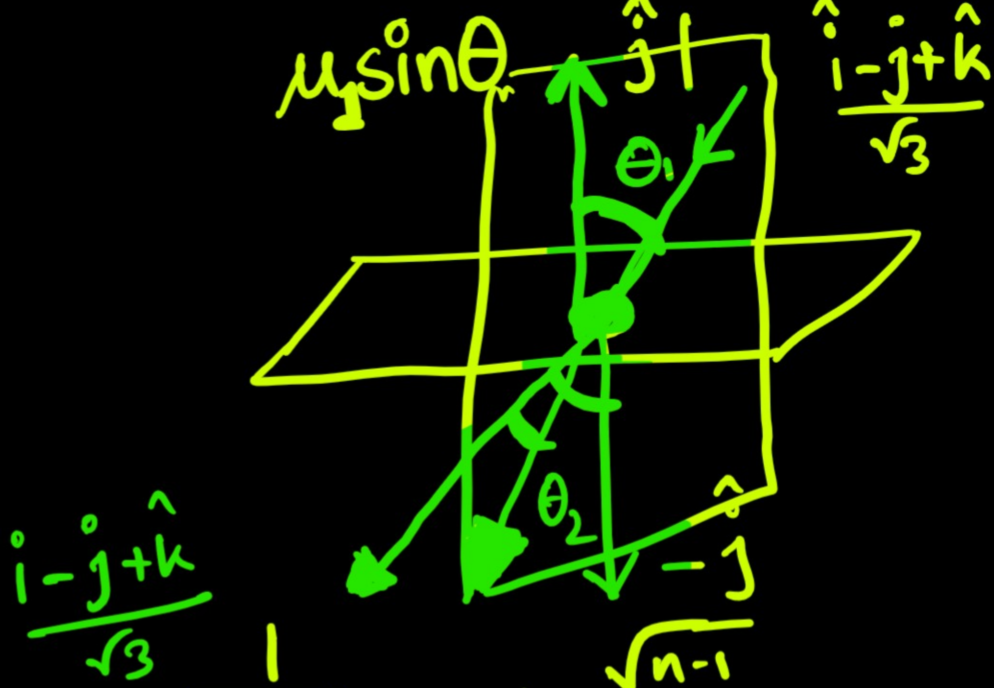
$$\mu_1 \sin\theta_1 = \mu_2 \sin\theta_2$$

$$\Rightarrow \quad 1 \times \frac{\sqrt{2}}{2\sqrt{3}} = 2\sin\theta_2$$

$$AB\cos\theta = \vec{A}\cdot\vec{B} = \frac{1}{\sqrt{3}}$$

$$\cos\theta_1 = \frac{1}{\sqrt{3}} \qquad \boxed{\sin\theta_1 = \frac{\sqrt{2}}{\sqrt{3}}}$$

$$\sin\theta_2 = \frac{1}{\sqrt{6}} \qquad \boxed{\cos\theta_2 = \frac{\sqrt{5}}{\sqrt{6}}}$$



$$\frac{1}{\sqrt{n}} \rightarrow \frac{\sqrt{n-1}}{\sqrt{n}}$$

$\theta_1 =$ $\qquad$ $\theta_2 =$

$$1 \cdot 1 \cos\theta_2 = (-\hat{j}) \cdot (b_x \hat{i} + b_y \hat{j} + b_z \hat{k})$$

$$-\frac{\sqrt{5}}{\sqrt{6}} = \quad b_y$$

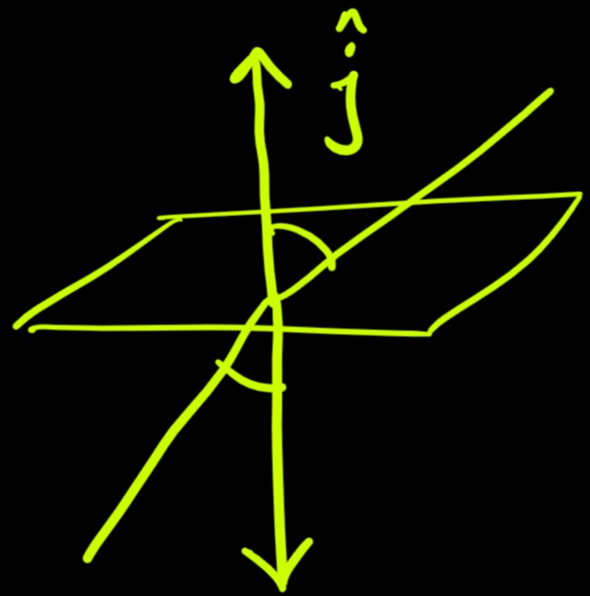
$$-\frac{\sqrt{5}}{\sqrt{6}} \hat{j}$$

$$\lambda\left(b_x\hat{i} - \frac{\sqrt{5}}{\sqrt{6}}\hat{j} + b_z\hat{k}\right) + \mu\left(\frac{\hat{i}-\hat{j}+\hat{k}}{\sqrt{3}}\right) = -\hat{j}$$

$$\lambda b_x + \frac{\mu}{\sqrt{3}} = 0$$

$$\lambda b_x = \left(-\frac{\mu}{\sqrt{3}}\right) = \lambda b_z$$

$$+\left(\lambda\frac{\sqrt{5}}{\sqrt{6}} + \frac{\mu}{\sqrt{3}}\right) = \overset{1}{+1}$$



$\boxed{XZ} \rightarrow \hat{j}$

$\boxed{XY} \rightarrow \hat{k}$

$\boxed{YZ} \rightarrow \hat{i}$

$\cos\theta_1 = \frac{1}{\sqrt{3}}$ $\boxed{\sin\theta_1 = \frac{\sqrt{2}}{\sqrt{3}}}$

$\cos(-\theta) = \cos\theta$

$\sin\theta_2 = \frac{1}{\sqrt{6}}$ $\boxed{\cos\theta_2 = \frac{\sqrt{5}}{\sqrt{6}}}$

$\underbrace{b_x^2 + b_z^2}_{=\frac{1}{6}} + \frac{5}{6} = 1$

$\left(b_x\hat{i} - \frac{\sqrt{5}}{\sqrt{6}}\hat{j} + b_z\hat{k}\right)\left(\frac{\hat{i} - \hat{j} + \hat{k}}{\sqrt{3}}\right)$

(1.1) $\cos(\theta_1 - \theta_2) = \cos\theta_1\cos\theta_2 + \sin\theta_1\sin\theta_2$

$= \frac{1}{\sqrt{3}} \times \frac{\sqrt{5}}{\sqrt{6}} + \frac{\sqrt{2}}{\sqrt{3}} \times \frac{1}{\sqrt{6}}$

$= \frac{\sqrt{2}+\sqrt{5}}{\sqrt{18}}$

$\boxed{b_x = b_z}$

$2(b_x^2 + b_y^2) = \frac{2}{6} = \frac{1}{3}$

$\frac{\sqrt{2}+\sqrt{5}}{\sqrt{18}} = \frac{b_x}{\sqrt{3}} + \left(\frac{\sqrt{5}}{\sqrt{18}}\right) + \frac{b_z}{\sqrt{3}}$

$(b_x + b_z)^2 + (b_x - b_z)^2 = \left(\frac{1}{3}\right)$

$\frac{\sqrt{2}}{\sqrt{2 \times 9}} = \frac{1}{3} = \frac{b_x + b_z}{\sqrt{3}}$

$b_x + b_z = \left(\frac{1}{\sqrt{3}}\right)$

$$b_x = \frac{1}{2\sqrt{3}} = b_z \qquad b_y = -\frac{\sqrt{5}}{\sqrt{6}} \qquad \cos\theta_2 =$$

$$\left(\frac{1}{2\sqrt{3}}\right)^2 + \left(\frac{1}{2\sqrt{3}}\right)^2 + \frac{5}{6} =$$

$$\frac{1}{12} + \frac{1}{12} + \frac{5}{6} =$$

$$\frac{1}{6} + \frac{5}{6} = 1 \qquad \checkmark$$

$$\begin{pmatrix} a_1x+b_1y+c_1z \\ a_2x+b_2y+c_2z \\ a_3x+b_3y+c_3z \end{pmatrix} = \begin{pmatrix} d_1 \\ d_2 \\ d_3 \end{pmatrix}$$

$$\begin{pmatrix} a_1x+b_1y+c_1z \\ a_2x+b_2y+c_2z \\ a_3x+b_3y+c_3z \end{pmatrix} = \begin{pmatrix} d_1 \\ d_2 \\ d_3 \end{pmatrix}$$

$$A\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} x-y \\ x+y \\ 0 \end{pmatrix}$$

$$\bar{A}'$$

$$\underbrace{\begin{pmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{pmatrix}}_{A} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} d_1 \\ d_2 \\ d_3 \end{pmatrix}$$

$$3\times\boxed{3 \quad\quad 3}\times 1$$

$$A\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1x - y + 0z \\ x + y + 0z \\ 0x + 0y + 0z \end{pmatrix} = \begin{pmatrix} 1 & -1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

$$\begin{pmatrix} 2x+3y+4z \\ -x+7y-9z \\ +x-6y+3z \end{pmatrix} = \begin{pmatrix} a \\ b \\ c \end{pmatrix} \qquad \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} \end{pmatrix} ?$$

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$$\begin{pmatrix} 2 & 3 & 4 \\ -1 & 7 & -9 \\ 1 & -6 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} a \\ b \\ c \end{pmatrix} \quad \Downarrow \quad 11 \neq 0 \ \checkmark$$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} \underline{\qquad\qquad} \\ \underline{\qquad\qquad} \\ \underline{\qquad\qquad} \end{pmatrix}$$