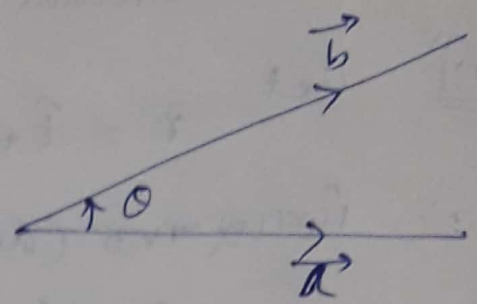


দুটা ভেক্টর পূৰণফল :
(Product of Two vectors)

1. স্কেলার পূৰণ (Scalar product)
স ওট পূৰণ :



দুটা ভেক্টর \vec{a} ও \vec{b} ক স্কেলার

পূৰণক $\vec{a} \cdot \vec{b}$ - কে বুলোয়া হয় যাকে ইংরেজি ভাষায় (definition) ই'ল

$$\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta$$

য'ত θ হ'ল \vec{a} ও \vec{b} - ক মধ্যস্থ কোণ (angle), $0 \leq \theta < \pi$.

পর্যবেক্ষণ (Observation) :

1. $\vec{a} \cdot \vec{b}$ এটা বাস্তব সংখ্যা (Real number or scalar)

2. $\vec{a} \cdot \vec{b} = 0 \iff \vec{a} \perp \vec{b}$

3. $\theta = 0 \implies \vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}|, \therefore \cos 0 = 1.$

$\therefore \vec{a} \cdot \vec{a} = |\vec{a}|^2 = a^2$

4. $\theta = \pi \implies \vec{a} \cdot \vec{b} = -|\vec{a}| |\vec{b}|, \therefore \cos \pi = -1.$

5. $\hat{i} \cdot \hat{i} = \hat{j} \cdot \hat{j} = \hat{k} \cdot \hat{k} = 1$
& $\hat{i} \cdot \hat{j} = \hat{j} \cdot \hat{k} = \hat{k} \cdot \hat{i} = 0$ } $\implies \left. \begin{array}{l} \therefore \hat{i} \cdot \hat{i} = |\hat{i}| |\hat{i}| \cos 0^\circ \\ = 1 \cdot 1 = 1 \\ \hat{i} \cdot \hat{j} = |\hat{i}| |\hat{j}| \cos 90^\circ \\ = 1 \cdot 1 \cdot 0 \\ = 0 \text{ etc. etc.} \end{array} \right\}$

6. $\cos \theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$

7. $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{a}$

ଦୁଇଟି ଗୁଣ ଉପରେ ଗୁରୁତ୍ୱ ଦେବା
(Two important properties of scalar product)

(1) a · (b + c) = a · b + a · c

(2) (λ a) · b = λ (a · b) = a · (λ b), λ ଏକ ସଂଖ୍ୟା

§. ସଂଖ୍ୟାତମ ଗୁଣ ଉପରେ ଗୁରୁତ୍ୱ ଦେବା :
(Scalar product in terms of components)

Let, a = a1i + a2j + a3k

b = b1i + b2j + b3k

∴ a · b = (a1i + a2j + a3k) · (b1i + b2j + b3k)
= a1i · (b1i + b2j + b3k) + a2j · (b1i + b2j + b3k) + a3k · (b1i + b2j + b3k)
= a1b1(i · i) + a1b2(i · j) + a1b3(i · k) + a2b1(j · i) + a2b2(j · j) + a2b3(j · k) + a3b1(k · i) + a3b2(k · j) + a3b3(k · k)
= a1b1 + a2b2 + a3b3

∴ a · b = a1b1 + a2b2 + a3b3

অনুশীলনী 10.3
Exercise 10.3

8.1. \vec{a} ও \vec{b} (স্কেল) দ্বারা $\sqrt{3}$ ও 2 এবং $\vec{a} \cdot \vec{b} = \sqrt{6}$ । (The magnitude of the vector \vec{a} and \vec{b} are $\sqrt{3}$ and 2 respectively and $\vec{a} \cdot \vec{b} = \sqrt{6}$. Find the angle between the vectors.)

Soln. Given, $|\vec{a}| = \sqrt{3}$, $|\vec{b}| = 2$, $\vec{a} \cdot \vec{b} = \sqrt{6}$

Now, we know,

$\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta$, where θ is the angle between \vec{a} and \vec{b} .

$\Rightarrow \sqrt{6} = \sqrt{3} \cdot 2 \cos \theta$

$\Rightarrow \cos \theta = \frac{\sqrt{6}}{\sqrt{3} \cdot 2} = \frac{\sqrt{3} \cdot \sqrt{2}}{\sqrt{3} \cdot \sqrt{2} \cdot \sqrt{2}} = \frac{1}{\sqrt{2}}$

$\Rightarrow \cos \theta = \frac{1}{\sqrt{2}}$

$\Rightarrow \theta = 45^\circ = \frac{\pi}{4} \leftarrow \text{Ans.}$

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