





- Multiplication of Vectors
- Dot Product
- Properties of Dot Product
- Cross Product
- Properties of Cross Product





### **Multiplication of Vectors**















mægnitude one **Dot Products of Rectangular Unit Vectors** A.B = |AI |B| CODO  $\frac{1}{90} \Rightarrow \theta = 90 \Rightarrow \cos \theta = \cos^2 90 = 0$ \$ \$,K  $= \left| \hat{i} \right| \left| \hat{i} \right| \cos(0) = 1.1.1 = 1_{2}$ Xaxis Xaxis AX = 0





# Poll Question 01

What is the dot product between 
$$2\hat{i} + 3\hat{k}$$
 and  $5\hat{j}$ ?  
(a) 15  
(b) 17  
(c) 10  
 $\vec{A} = A_x^{i} + A_y^{i} + A_z^{i} + A_z^{i} + A_z^{i} + A_z^{i} + A_z^{i} + B_z^{i} + B$ 



$$\begin{array}{c} \hline Properties of Dot Product\\ \hline Commutative Property \\ \hline B = included angle \\ \hline B = I\overrightarrow{A} | I\overrightarrow{B} | con \theta \\ \hline B = I\overrightarrow{B} | |\overrightarrow{A} | con \theta \\ \hline B = I\overrightarrow{B} | |\overrightarrow{A} | con \theta \\ \hline A = I\overrightarrow{B} | |\overrightarrow{A} | con \theta \\ \hline A = \overrightarrow{A} \cdot \overrightarrow{B} = \overrightarrow{B} \cdot \overrightarrow{A} \\ \hline \overrightarrow{A} \cdot \overrightarrow{B} = \overrightarrow{B} \cdot \overrightarrow{A} \\ \hline \overrightarrow{A} \cdot \overrightarrow{B} = \overrightarrow{B} \cdot \overrightarrow{A} \end{array}$$





#### **Practice Problem**

 $\overline{A} = 3\hat{\imath} + m\hat{\jmath} + 3\hat{k}$  and  $\overline{B} = -2\hat{\imath} + 3\hat{\jmath}$  Find m if the vectors are perpendicular.









Practice Problem  

$$\bar{A} = 4\ell + 3\hat{j}$$
 and  $\bar{B} = 2\hat{i} + 4\hat{j} + k$   
(b) Find the projection of A onto B.  
 $|\vec{A}| co_2 \theta = \frac{\vec{A} \cdot \vec{B}}{|\vec{B}|}$ 





1) Increase the distance from the axis 2) Increase cross Product of lor rector θ Fcont & position Tonque, [2] = [r? [X] Flsind vector 1元14 一记代 マードネ×ドー পদার্থবিজ্ঞান ১ম পত্র অধ্যায় ০২ : ভেক্টর









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পদার্থবিজ্ঞান ১ম পত্র অধ্যায় ০২ : ভেক্টর





[AxB]= [A][B]sino

ANB AxB=0

**Cross Products of Rectangular Unit Vectors** 









#### **Practice Problem**

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 $\overline{A} = 2\hat{\imath} + mj - 3\hat{k}$  and  $\overline{B} = 6\hat{\imath} + 3\hat{j} - 9\hat{k}$  Find the value of m if the vectors are parallel.

$$\vec{A} = \vec{B} = \vec{A} \times \vec{B} = 0$$

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{i} & \hat{k} \\ 2 & m & -3 \\ 6 & 3 & -9 \end{vmatrix}$$

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{k} \\ 2 & m & -3 \\ 6 & 3 & -9 \end{vmatrix}$$

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{k} \\ -9m + 9 \end{vmatrix} - \vec{A} (-18 + 16) + \vec{K} (6 - 6m)$$

$$= 1 (-9m + 9) - \vec{A} (-18 + 16) + \vec{K} (6 - 6m)$$

$$= 0$$
Physics 1<sup>st</sup> Paper

Chapter 2 : Vector

 $\overline{A} = 2\hat{\imath} + mj - 3\hat{k}$  and  $\overline{B} = 6\hat{\imath} + 3\hat{j} - 9\hat{k}$  Find the value of m if the vectors are parallel.

$$\vec{A} \times \vec{B} = \hat{i} (-9m+9) + \hat{k} (6-6m) = 0$$
  
 $\vec{A} \times \vec{B} = \hat{i} (-9m+9) + \hat{k} (6-6m) = 0$   
 $\vec{S}_{0,} -9m+9 = 0$   $OR_{,} 6-6m = 0$   
 $\Rightarrow m=1$ 





## Calculus ???

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**Resource:** 

ক্যালকুলাসের অ-আ-ক-খ (চমক হাসান)



https://www.youtube.com/playlist?list=PL8586BC0C4A8EB968



## Resources:

https://www.geogebra.org/m/ya845Car

https://www.geogebra.org/m/psMTGDgc





www.udvash.com