# Mavzu-7. Vektorlarning vektor ko'paytmasi, aralash ko'paytmasi, xossalari. Vektorlar algebrasining amaliy qo'llanishi.

**Reja:**

1. Vektor ko'paytma.
2. Aralash ko'paytma.
3. Vektorlar algebrasining amaliy qo'llanishi.

Vektorlarning vektor ko'paytmasi

$\bar{a}=(x_1,y_1,z_1)$ va $\bar{b}=(x_2,y_2,z_2)$ bo'lsin,

a va b vektorlarning vektor ko'paytmasi deb

$\left[\bar{a}\bar{b}\right]=\left(\begin{vmatrix} y_1 & z_1 \\ y_2 & z_2 \end{vmatrix},\begin{vmatrix} z_1 & x_1 \\ z_2 & x_2 \end{vmatrix},\begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix}\right)$ ifodaga aytiladi.

Demak, $\left[\bar{a}\bar{b}\right]=\left(y_1z_2-y_2z_1 \quad z_1x_2-x_1z_2 \quad x_1y_2-y_1x_2\right)$

**Misol** $\bar{a}$=(3,2,0) , $\bar{b}$=(-3,4,2) bo'lsa , $\left[\bar{a}\bar{b}\right]$=?

$$\left[\bar{a}\bar{b}\right]=\left(\begin{vmatrix} 2 & 0 \\ 4 & 2 \end{vmatrix},\begin{vmatrix} 0 & 3 \\ 2 & -3 \end{vmatrix},\begin{vmatrix} 3 & 2 \\ -3 & 4 \end{vmatrix}\right)=\left(4-0 \quad 0-6 \quad 12+6\right)=\left(4 \quad -6 \quad 18\right)$$

**Vektor ko'paytma xossalari**

1. $\left[\bar{a}\bar{b}\right]=-\left[\bar{b}\bar{a}\right]$
2. $\left[(\lambda\bar{a})\bar{b}\right]=\lambda\left[\bar{a}\bar{b}\right]$ , $\left[\bar{a}(\lambda\bar{b})\right]=\lambda\left[\bar{a}\bar{b}\right]$ $\lambda\in R$
3. $\left[\bar{a}(\bar{b}+\bar{c})\right]=\left[\bar{a}\bar{b}\right]+\left[\bar{a}\bar{c}\right]$
4. $\left[(\bar{a}+\bar{b})\bar{c}\right]=\left[\bar{a}\bar{c}\right]+\left[\bar{b}\bar{c}\right]$

**Uchta vektorning aralash ko'paytmasi**

$\bar{a}=(x_1,y_1,z_1)$ , $\bar{b}=(x_2,y_2,z_2)$ , $\bar{c}=(x_3,y_3,z_3)$

$$\left[\bar{a}\bar{b}\right]=\left(\begin{vmatrix} y_1 & z_1 \\ y_2 & z_2 \end{vmatrix}\bar{i}+\begin{vmatrix} z_1 & x_1 \\ z_2 & x_2 \end{vmatrix}\bar{j}+\begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix}\bar{k}\right) \quad , \quad \bar{c}=x_3*\bar{i}+y_3*\bar{j}+z_3*\bar{k}$$

$$\left[\bar{a}\bar{b}\right]*\bar{c}=\left(\begin{vmatrix} y_1 & z_1 \\ y_2 & z_2 \end{vmatrix}\bar{i}+\begin{vmatrix} z_1 & x_1 \\ z_2 & x_2 \end{vmatrix}\bar{j}+\begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix}\bar{k}\right)(x_3*\bar{i}+y_3*\bar{j}+z_3*\bar{k})=$$

$$=\begin{vmatrix} y_1 & z_1 \\ y_2 & z_2 \end{vmatrix}x_3+\begin{vmatrix} z_1 & x_1 \\ z_2 & x_2 \end{vmatrix}y_3+\begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix}z_3=\begin{vmatrix} x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \\ x_3 & y_3 & z_3 \end{vmatrix}$$

Aralash ko'paytmaning ma'nosi $\bar{a},\bar{b},\bar{c}$ vektorlarga qurilgan parallelipipedning hajmini ifodalaydi.

Takrorlash uchun savollar:

1. Vektorlar haqida tushuncha.
2. $\bar{a}=(3,5)$ , $\bar{b}=(-2,7)$ $3\bar{a}+\bar{b}=?$
3. Agar A(3;8;-5) , B(4;-6;1) bo'lsa, $\left|\overline{AB}\right|=?$
4. $\bar{a}=(3;0-2)$ , $\bar{b}=(-6;-2;1)$ bo'lsa $\bar{a}*\bar{b}=?$
5. $\bar{a}=(3;0;-2)$ , $\bar{b}=(-6;-2;1)$ bo'lsa, $[\bar{a}*\bar{b}]=?$
6. $\bar{a}=(3;8;1)$ , $\bar{b}=(5;2;6)$ , $\bar{c}=(-2;-5;-15)$ bo'lsa, $\left[\bar{a}\bar{b}\right]*\bar{c}=?$

Foydalanilgan adabiyotlar:


1. Oliy matematika. (F.Rajabov) 2007-y. Toshkent.
2. Курс математического анализа. (Л. Кудрявцев) 1998-г. Москва.
3. www.mathprofi.ru internet sayti.