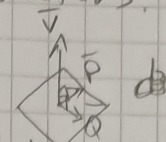
Vector product of 2vectors.

V. product = $\bar{V} = \bar{P} \times \bar{Q}$



Direction = Right hand Rule

$V = PQ \sin\theta$

V.product = Cross product (diff name)

$$\bar{P}\cdot\bar{Q} = -\bar{Q}\cdot\bar{P} \; ; \quad \bar{P}\cdot(\bar{Q}_1 + \bar{Q}_2) = \bar{P}Q_1 + \bar{P}Q_2$$

$$(\bar{P}\cdot\bar{Q})\cdot\bar{S} \neq \bar{P}\cdot(\bar{Q}\cdot\bar{S})$$

Rectangular Components.

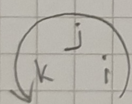
if $\bar{i}\cdot\bar{j} = \bar{k}$

$\therefore$

$\bar{i}\cdot\bar{i} = 0 \qquad \bar{j}\cdot\bar{i} = -\bar{k}$

$\bar{i}\cdot\bar{j} = \bar{k} \qquad \bar{j}\cdot\bar{j} = 0$

$\bar{i}\cdot\bar{k} = -\bar{j} \qquad \bar{j}\cdot\bar{k} = \bar{i}$



$\bar{k}\cdot\bar{i} = \bar{j}$

$\bar{k}\cdot\bar{j} = -\bar{i}$

$\bar{k}\cdot\bar{k} = 0$

$$\bar{V} = \bar{P}\cdot\bar{Q}$$
$$= (P_x i + P_y j + P_z k)\cdot(Q_x i + Q_y j + Q_z k)$$
$$= P_xQ_y\bar{k} - P_xQ_z\bar{j} - P_yQ_x\bar{k} + P_yQ_z\bar{i} + P_zQ_x j - P_zQ_y\bar{i}$$

$V = V_{\bar{i}} + V_{\bar{j}} + V_{\bar{k}}$

$V_i = P_yQ_z - P_zQ_y = V_x$

$V_j = -P_xQ_z + P_zQ_x = V_y$

$V_k = P_xQ_y - P_yQ_x = V_z$

Varignon's Theorem

$$r\cdot(F_1 + F_2 + F_3 \ldots + F_n) = r\cdot F_1 + r\cdot F_2 + r\cdot F_3 + \ldots r\cdot F_n$$

Expansion of Determinant.

$$V = \begin{array}{ccc} (+)\bar{i} & (-)\bar{j} & (+)\bar{k} \\ \end{array}$$
$$V = \begin{vmatrix} P_x & P_y & P_z \\ Q_x & Q_y & Q_z \end{vmatrix}$$

$V_x = P_yQ_z - P_zQ_y$

$V_y = (P_xQ_z - P_zQ_x)$

$V_z = P_xQ_y - P_yQ_x$