1) Vector product does not obey commutative law of multiplication.

i.e. $\vec{P} \times \vec{Q} \neq \vec{Q} \times \vec{P}$

However, $|\vec{P} \times \vec{Q}| = |\vec{Q} \times \vec{P}|$

2) The vector product obeys the distributive law of multiplication.

i.e. $\vec{P} \times (\vec{Q} + \vec{R}) = \vec{P} \times \vec{Q} + \vec{P} \times \vec{R}$

3) If θ =0. i.e., if the two nonzero vectors are parallel to each other, their vector product is a zero vector,

$\vec{P} \times \vec{Q} = P\,Q\sin 0 = 0$

4) If θ = 180°, i.e., if the two nonzero vectors are anti-parallel, their vector product is a zero vector,

$\vec{P} \times \vec{Q} = P\,Q\sin 180° = 0$

5) If θ = 90°, i.e., if the two nonzero vectors are perpendicular to each other, the magnitude of their vector product is equal to the product of magnitudes of the two vectors.

i.e. $\vec{P} \times \vec{Q} = PQ$

Then from this we can conclude that,

$\hat{\imath} \times \hat{\jmath} = \hat{k}\,,\ \hat{\jmath} \times \hat{k} = \hat{\imath}\,,\ \hat{k} \times \hat{\imath} = \hat{\jmath}$

6) If $\vec{P} = \vec{Q}$, then $\vec{P} \times \vec{Q} = 0$

Then from this we can conclude that,

$\hat{\imath} \times \hat{\imath} = 0\,,\ \hat{\jmath} \times \hat{\jmath} = 0\,,\ \hat{k} \times \hat{k} = 0$

7) If the vectors $\vec{P}$ and $\vec{Q}$ are given in terms of its component vectors as,

$\vec{P} = P_x\hat{\imath} + P_y\hat{\jmath} + P_z\hat{k}$ and $\vec{Q} = Q_x\hat{\imath} + Q_y\hat{\jmath} + Q_z\hat{k}$ then the magnitude of vector products is given as,

$$\vec{P} \times \vec{Q} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & k \\ P_x & P_y & P_z \\ Q_x & Q_y & Q_z \end{vmatrix}$$

8) The area of parallelogram having adjacent sides given by vectors $\vec{P}$ & $\vec{Q}$ is then written as,

Area of parallelogram = $\left|\vec{P} \times \vec{Q}\right|$