INDIAN SCHOOL MUSCAT

DEPARTMENT OF MATHEMATICS

VECTOR ALGEBRA

CLASS-12

1) Find the magnitude of the following vector:- $\vec{a} = 2\hat{\imath} - 7\hat{\jmath} - 3\hat{k}$

2) Find the unit vector in the direction of the vector $\vec{a} = \hat{\imath} + \hat{\jmath} + 2\hat{k}$.

3) Find the vector joining the points P(5,3,0) and Q(-1,-2,-4) Q to P.

4) Find the position vector of the midpoint of the vector joining the points P(,3-2,0) and Q(1,-1,2).

5) Find the projection of the vector $\vec{a}$=$2\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$ on the vector $\vec{b} = \hat{\imath} + 2\hat{\jmath} + \hat{k}$

6) If a is a unit vector and $(\vec{x} - \vec{a}).(\vec{x} + \vec{a}) = 8, then\ find\ |\vec{x}|$

7) Find the area of a triangle having the points A(1,2,3), B(2-1,1) and C(-1,2,3,) as its vertices.

8) Find the area of a parallelogram whose adjacent sides are determined by the vectors **a**=$\hat{\imath} - \hat{\jmath} + 3\hat{k}\ and\ \boldsymbol{b} = 2\hat{\imath} - 7\hat{\jmath} + \hat{k}$.

9)The two adjacent sides of a parallelogram are $2\hat{\imath} - 4\hat{\jmath} + 5\hat{k}\ and\ \hat{\imath} - 2\hat{\jmath} - 3\hat{k}$. Find the unit vector parallel to its diagonal . Also , Find its Area.

9) Given $|\vec{a}| = 13, |\vec{b}| = 5, and\ \vec{a}.\vec{b} = 60\ .find\ |\vec{a}\ x\vec{b}|$.

10) Find $\lambda\ and\ \mu$ if $(2\hat{\imath} + 6\hat{\jmath} + 27\hat{k})\ x\ (\hat{\imath} + \lambda j + \mu k) = \vec{0}$

11) If $\vec{a}$ and $\vec{b}$ are Unit vectors Inclined at an angleθ, then prove that $\sin\frac{\theta}{2} = \frac{1}{2}|\hat{a} - \hat{b}|$.

12) If with reference to the right handed system of mutually perpendicular unit vectors $\hat{\imath}, \hat{\jmath}\ and\ \hat{k}, \vec{\alpha} = 3\hat{\imath} - \vec{\jmath}$,$\vec{\beta} = 2\hat{\imath} + \hat{\jmath} - 3\hat{k}$, then express $\overrightarrow{\beta}$ in the form $\overrightarrow{\beta} = \overrightarrow{\beta_1} + \overrightarrow{\beta_2}$ where $\overrightarrow{\beta_1}$ is parallel to $\vec{\alpha}$ and $\overrightarrow{\beta_2}$ is perpendicular to $\vec{\alpha}$.

13) $\vec{a}$ = $\hat{\imath}$ + 4$\hat{\jmath}$ +2$\hat{k}$, $\vec{b}$ =3 $\hat{\imath}$ - 2$\hat{\jmath}$ +7$\hat{k}$, $\vec{c}$ = 2 $\hat{\imath}$ - $\hat{\jmath}$ +4$\hat{k}$,Find a vector $\vec{d}$ which is perpendicular to both $\vec{a}$ and $\vec{b}$ & $\vec{c}.\vec{d}$ = 15

14. If $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$ are three vectors such that their magnitudes are 3, 4 and 5 respectively and $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$ then find the value of $\overrightarrow{a}.\overrightarrow{b} + \overrightarrow{b}.\overrightarrow{c} + \overrightarrow{c}.\overrightarrow{a}$

15.Find τ if the vectors $\vec{a} = \hat{\imath} + \hat{3\jmath} + \hat{k}$, $\vec{b} = \hat{2\imath} - \hat{\jmath} - \hat{k}$ and $\vec{c} = \tau\hat{\imath} + \hat{7\jmath} + 3\hat{k}$ are coplanar.

16. If $\vec{a}$ = $\hat{\imath}$ - 2$\hat{\jmath}$ +3$\hat{k}$ and $\vec{b}$ =2 $\hat{\imath}$ +3$\hat{\jmath}$ − 5$\hat{k}$, then find $\vec{a}\ x\ \vec{b}$ and verify $\vec{a}\ x\ \vec{b}$ is perpendicular to $\vec{a}$.

17. Find the value of λ, if the points A(-1,4,-3),B(3, λ,-5), C(-3,8,-5) and D(-3,2,1) are coplanar.