MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

APPLICATIONS OF VECTORA ALGEBRA

Exercise 6 1

1. Prove by vector method that median to the base of an isoscels triangle is perpendicular to the base.

2. Prove by vector method that an angle in a semi-circle is a right angle.

3. Prove by vector method that the diagonals of a rhombus bisect each other at right angles.

Watch Video Solution

4. Using vector method, prove that if the diagonals of a parallelogram are equal, then it is a rectangle.

Watch Video Solution

5. Prove by vector method that the area of the quadrilateral ABCD having diagonals AC and is $\frac{1}{2}\left|\overline{AC}\times\overline{BD}\right|$

Watch Video Solution

6. Prove by vector method that the parallelograms on the same base and between the same parallels are equal in area.

Watch Video Solution

Watch Video Solution

7. If G is the centroid of a ΔABC, Prove that (area of ΔGAB) $=$ (area of ΔGBC) $=$ (are

Watch Video Solution

8. Using vector method, prove $\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$.

Watch Video Solution

9. Prove by vector method that $\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$.

Watch Video Solution

10. A particle acted on by constant forces $8\hat{i} + 2\hat{j} - 6\hat{k}$ and $6\hat{i} + 2\hat{j} - 2\hat{k}$ is displaced from the point $(1, 2, 3)$ to

the point $(5, 4, 1)$.

Find the total work done by the forces.

Watch Video Solution

11. Forces of magnitude $5\sqrt{2}$ and $10\sqrt{2}$ units acting in the directions $3\hat{i} + 4\hat{j} + 5k$ and $10\hat{j} + 6\hat{j} - 8\hat{k}$, respectively, act on a particle which is displaced from the point with position vector $4\hat{i} - 3\hat{j} - 2\hat{k}$ to the with position vector $6\hat{i} + \hat{j} - 3\hat{k}$. Find the work done by the forces.

Watch Video Solution

12. Find the magnidude and direction cosines of the torque of a force represented by $3\hat{i} + 4\hat{j} - 5\hat{k}$ about the point with position vector $2\hat{i} - 3\hat{j} + 4\hat{k}$ acting through a point whose position vector is $4\hat{i} + 2\hat{j} - 3\hat{k}$.

Watch Video Solution

13. Find the torque of the resultant of the three forces represented by $-3\hat{i}+6\hat{j}-3\hat{k}, 4\hat{i}-10\hat{j}+12\hat{k}$ and $4\hat{i}+7\hat{j}$ acting at the point with position vector $8\hat{i}-6\hat{j}-4\hat{k}$, about the point with position vector $18\hat{i}-3\hat{j}-9\hat{k}$.

Watch Video Solution

Exercise 6 2

1. If $\vec{a}=\vec{i}+2\hat{j}+3\hat{k}, \vec{b}=2\hat{i}+\hat{j}-2\hat{k}, \vec{c}=3\hat{i}+\widehat{2j}+\hat{k}$, find $\vec{a}\cdot\left(\vec{b}\right.$

Watch Video Solution

2. Find the volume of the parallelepiped whose coterminous edges are represented by the vector $-6\hat{i}+14\hat{j}+10\hat{k}, 14\hat{i}-10\hat{j}-6\hat{k}$, and $2\hat{i}+4\hat{j}-2\hat{k}$.

Watch Video Solution

3. The volume of the parallelepiped whose coterminus edges are $7\hat{i} + \lambda\hat{j} - 3\hat{k}, \hat{i} + 2\hat{j} - \hat{k} - 3\hat{i} + 7\hat{j} + 5\hat{k}$ is 90 cubic units. Find the value of λ.

Watch Video Solution

4. If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors represented by concurrent edges of a parallelepiped of volume 4 cubic units, find the value of $\left(\vec{a} + \vec{b}\right) \cdot \left(\vec{b} \times \vec{c}\right) + \left(\vec{b} + \vec{c}\right) \cdot \left(\vec{c} \times \vec{a}\right) + \left(\vec{c} + \vec{a}\right) \cdot \left(\vec{a} \times$

Watch Video Solution

5. Find the altitude of a parallelepiped determined by the vectors $\vec{a} = -2\hat{i} + 5\hat{j} + 3\hat{k}$ $\vec{b} = \hat{i} + 3\hat{j} - 2\hat{k}$ and $\vec{c} = -3\hat{i} + \hat{j} + 4\hat{k}$ if the base is taken as the parallelogram determined by $\vec{b}$ and $\vec{c}$.

Watch Video Solution

6. Determine whether the three vectors $2\hat{i}+3\hat{j}+\hat{k}, \hat{i}-2\hat{j}+2\hat{k}$ and $3\hat{i}+\hat{j}+3\hat{k}$ are coplanar.

Watch Video Solution

7. Let $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{b}=\hat{i}$ and $\vec{c}=c_1\hat{i}+c_2\hat{j}+c_3\hat{k}.$ " If "c_(1)=1 and c_(2)=2" find "c_(3)" such that "vec(a), vec(b) and vec(c)" are coplanar. "`

Watch Video Solution

8. If $\vec{a}=\hat{i}+\hat{i}+\hat{k}. \vec{b}=\hat{i}$ and $\vec{c}=c_1\hat{i}+c_2\hat{j}+c_3\hat{k}.$ " If "c_(1)=1andc_(2)=2" find "c_(3)" such that "vec(a),vec(b)andvec(c)" are coplanar. "` depends on neither x nor y .

Watch Video Solution

9. If the vectors $a\hat{i}+a\hat{j}+c\hat{k},\ \hat{i}+\hat{j}$andchat(i)+chat(j)+bhat(k)` are coplanar, prove that c is the geometric mean of a and b .

Watch Video Solution

10. Let $\vec{a}, \vec{b}, \vec{c}$ be three non-zero vectors such that $\vec{c}$ is a unit vector perpendicular to both $\vec{a}$ and $\vec{c}$. If the angle between $\vec{a}$ and $\vec{c}$ is $\frac{\pi}{6}$, show that $\left[\vec{a}, \vec{b}, \vec{c}\right]^2 = \frac{1}{4}\left|\vec{a}\right|^2\left|\vec{b}\right|^2$.

Watch Video Solution

Exercise 6 3

1. If $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}, \vec{b} = 2\hat{i} + \hat{j} - 2\hat{k}, \vec{c} = 3\hat{i} + 2\hat{j} + \hat{k}$, find (i) $\left(\vec{a} \times\right.$

Watch Video Solution

2. For any vector $\vec{a}$, prove that $\hat{i} \times \left(\vec{a} \times \vec{i}\right) + \hat{j} \times \left(\vec{a} \times \vec{j}\right) + \hat{k} \times \left(\vec{a} \times \hat{k}\right) = 2\vec{a}$

Watch Video Solution

3. prove that $\left[\vec{a} - \vec{b}, \vec{b} - \vec{c}\,\vec{c} - \vec{a}\right] = 0$

Watch Video Solution

4. If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k},\ \vec{b} = 3\hat{i} + 5\hat{j} + 2\hat{k},\ \vec{c} = -\hat{i} - 2\hat{j} + 3\hat{k},$
$\left(\vec{a} \times \vec{b}\right) \times \vec{c} = \left(\vec{a} \cdot \vec{c}\right)\vec{b} - \left(\vec{b} \cdot \vec{c}\right)\vec{a}$

Watch Video Solution

5. If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k},\ \vec{b} = 3\hat{i} + 5\hat{j} + 2\hat{k},\ \vec{c} = -\hat{i} - 2\hat{j} + 3\hat{k},$
$\vec{a}\left(\vec{a} \times \vec{b}\right) = \left(\vec{a} \cdot \vec{c}\right)\vec{b} - \left(\vec{a} \cdot \vec{b}\right)\vec{c}$

Watch Video Solution

6.

$\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}, \vec{b} = -\hat{i} + 2\hat{j} - 4\hat{k}, \vec{c} = \hat{i} + \hat{j} + \hat{k}$ then find the of

Watch Video Solution

7. If $\vec{a}, \vec{b}, \vec{c}$ are coplanar vectors, show that $\left(\vec{a} \times \vec{b}\right) \times \left(\vec{c} \times \vec{d}\right) = \vec{0}$

Watch Video Solution

8. If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}, \vec{b} = 2\hat{i} - \hat{j} + \hat{k}, \vec{c} = 3\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{a} \times \left(\vec{b} \times \vec{c}\right.$

find the values fo l,m,n.

Watch Video Solution

9. If $\hat{a}, \hat{b}, \hat{c}$ are three unit vectors such that $\hat{b}$ and $\hat{c}$ are non-parallel and $\hat{a} \times \left(\hat{b} \times \hat{c}\right) = \frac{1}{2}\hat{b}$, find the angle between $\vec{a}$ and $\vec{c}$.

Watch Video Solution

Exercise 6 4

1. Find the non-parametric form of vector equation and Cartesian equations of the straight line passing through the point with position vector $4\hat{i} + 3\hat{j} - 7\hat{k}$ and parallel to the vector $2\hat{i} - 6\hat{j} + 7\hat{k}$.

Watch Video Solution

2. Find the parametric form of vector equation and Cartesian equtions of the straight line passing through the point $(-2, 3, 4)$ and parallel to the straight line $\frac{x-1}{-4} = \frac{y+3}{5} = \frac{8-z}{-6}$

Watch Video Solution

3. Find the point where the straight line passes through $(6, 7, 4)$ and $(8, 4, 9)$ cut the xz and yz planes.

Watch Video Solution

4. Find the direction cosines of the straight line passing through the points $(5, 6, 7)$ and $(7, 9, 13)$. Also, find the parametric form of vector equation and Cartesian equtions of the straight line passing through two given points.

Watch Video Solution

5. Find the acute angle between the following lines.

$$\vec{r} = \left(4\hat{i} - \hat{j}\right) + t\left(\hat{i} + 2\hat{j} - 2\hat{k}\right)$$

$$\vec{r} = \left(\hat{i} - 2\hat{j} + 4\hat{k}\right) + s\left(-\hat{i} - 2\hat{j} + 2\hat{k}\right)$$

Watch Video Solution

6. Find the acute angle between the following lines.

$$\frac{x+4}{3} = \frac{y-7}{4} = \frac{z+5}{5}, \vec{r} = 4\hat{k} + t\left(2\hat{i} + \hat{j} + \hat{k}\right)$$

Watch Video Solution

7. Find the acute angle between the following lines.

$2x = 3y = -z$ and $6x = -y = -4z$

Watch Video Solution

8. The vertices of ΔABC are $A(7, 2, 1), B(6, 0, 3),$ and $C(4, 2, 4)$. Find $\angle ABC$.

Watch Video Solution

9. If the straight line joining the points $(2, 1, 4)$ and $(a-1, 4, -1)$ is parallel to the line joining the points $(0, 2, b-1)$ and $(5, 3, -2)$, find the values of a and b.

Watch Video Solution

10. If the straight lines $\frac{x-5}{5m}=\frac{2-y}{5}=\frac{1-z}{-1}$ and $x=\frac{2y+1}{4m}=\frac{1-z}{-3}$ are perpendicular to each other, find the value of m.

Watch Video Solution

11. Show that the points $(2, 3, 4), (-1, 4, 5)$ and $(8, 1, 2)$ are collinear.

Watch Video Solution

Exercise 6 5

1. Find the parametric form of vector equation and Cartesian equations of a straight line passing through $(5, 2, 8)$and is perpendicular to the straight lines

Watch Video Solution

2. Show that the lines $\vec{r} = \left(6\hat{i} + \hat{j} + 2\hat{k}\right) + s\left(\hat{i} + 2\hat{j} - 3\hat{k}\right)$, and $\vec{r} = \left(3\hat{i} + 2\hat{j} - 2\hat{k}\right) + t\left(2\right.$ are skew lines and hence find the shortest distance between them.

Watch Video Solution

3. If the two lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-m}{2} = z$ intersect at a point, find the value of m.

Watch Video Solution

4. Show that the lines $\frac{x-3}{3} = \frac{y-3}{-1}, z-1=0$ and $\frac{x-6}{2} = \frac{z-1}{3}, y-2=0$ intersect. Also find the point of intersection.'

Watch Video Solution

5. Show that the straight lines $x+1=2y=-12z$ and $x=y+2=6z-6$ are skew and hence find the shortest distance between them.

Watch Video Solution

6. Find the parametric form of vector eqution of the straight line passing through $(-1, 2, 1)$ and paralle to the straight line $\overrightarrow{r}=\left(2\hat{i}+3\hat{j}-\hat{k}\right)+t\left(\hat{i}-2\hat{j}+\hat{k}\right)$ and lines find the shortest distance between the lines.

Watch Video Solution

7. Find the foot of the perpendicular drawn from the point $(5, 4, 2)$ to the line $\frac{x+1}{2}=\frac{y-3}{3}=\frac{z-1}{-1}$. Also, find the eqution of the perpendicular.

Watch Video Solution

Exercise 6 6

1. Find a parametric form of vector equation of a plane which is at a distance of 7 units from the origin having3,-4,5 as direction ratios of a normal to it .

Watch Video Solution

2. Find the direction cosines of the normal to the plane 12x + 3y - 4z = 65. Also, find the non-parametric form of vector equation of a plane and the length of the perpendicular to the plane from the origin.

Watch Video Solution

3. Find the vector and Cartesian equations of the plane passing through the point with position vector $2\hat{i} + 6\hat{j} + 3\hat{k}$ and normal to the vector $\hat{i} + 3\hat{j} + 5\hat{k}$.

Watch Video Solution

4. A plane passes through the point $(1, 1, 2)$ - and the normal to the plane of magnitude $3\sqrt{3}$ makes equal acute angles with the coordinate axes. Find the equation of the plane.

Watch Video Solution

5. Find the intercept cut off by the plane $\overrightarrow{r} = \left(6\hat{i} + 4\hat{j} - 3\hat{k}\right) = 12$ on the coordinate axes.

Watch Video Solution

6. If a plane meets the coordinate axes at A,B,C such that the centroid of the triangle ABC is the point (u, v, w), find the eqution of the plane.

Watch Video Solution

Exercise 6 7

1. Find the non-parametric form of vector equation, and Cartesian eqution of the plane passing through the point $(2, 3, 6)$ and parallel to the straight lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-3}{1}$ and $\frac{x+3}{2} = \frac{y-3}{-5} = \frac{z+1}{-3}$.

Watch Video Solution

2. Find the parametric form of vector equation, and Cartesian equations of the plane passing through the points $(2, 2, 1), (9, 3, 6)$ and perpendicular to the plane 2x + 6y + 6z = 9.

Watch Video Solution

Watch Video Solution

3. Find the parametric form vector eqution and Cartesian equations of the plane passing through the points $(2, 2, 1), (1, -2, 3)$ and parallel to the straight line passing through the points $(2, 1, -3)$ and $(-1, 5, -8)$.

Watch Video Solution

4. Find the non-parametric form of vector equation and Cartesian equation of the plane passing through the point $(1, -2, 4)$ and perpendicular to the plane x + 2y - 3z = 11 and parallel to the line $\frac{x+7}{3} = \frac{y+3}{-1} = \frac{z}{1}$.

Watch Video Solution

5. Find the parametric form of vector equation, and Cartesian equations of the plane containing the line

$\overrightarrow{r} = \left(\hat{i} - \hat{j} + 3\hat{k}\right) + t\left(2\hat{i} - \hat{j} + 4\hat{k}\right)$ and perpendicular to plane $\overrightarrow{r} \cdot \left(\hat{i}\right.$

Watch Video Solution

6. Find the parametric vector, non-parametric vector and Cartesian form of the equations of the plane passing through the three non-collinear points `(3,6,-2),(-1,-2,6)and(6,4,-2).

Watch Video Solution

7. Find the non-parametric form of vector equation, and Cartesian equations of the plane $\overrightarrow{r} = \left(6\hat{i} - \hat{j} + \hat{k}\right) + s\left(-\hat{i} + 2\hat{j} + \hat{k}\right) + t\left(-5\hat{j} - 4\hat{j} - 5\hat{k}\right)$

Watch Video Solution

Exercise 6 8

1. Show that the straight lines $\vec{r} = \left(5\hat{i} + 7\hat{j} - 3\hat{k}\right) + s\left(4\hat{i} + 4\hat{j} - 5\hat{k}\right)$ and $\vec{r} = \left(8\hat{i} + 4\hat{j} + 5\hat{k}\right) + t($

are coplanar. Find the vector equation of the plane in which they lie.

Watch Video Solution

2. Show that the lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{3}$ and $\frac{x-1}{-3} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar. Also, find the plane containing these lines.

Watch Video Solution

3. If the straight lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{m^2}$ and $\frac{x-3}{1} = \frac{y-2}{m^2} = \frac{z-1}{2}$ are coplanar, find the distinct real values of m.

Watch Video Solution

4. If the straight lines $\frac{x-1}{2}=\frac{y+1}{\lambda}=\frac{z}{2}$ and $\frac{x+1}{5}=\frac{y+1}{2}=\frac{z}{\lambda}$ are coplanar, find λ and equations of the planes containing theses two lines.

Watch Video Solution

Exercise 6 9

1. Find the equation of the plane passing through the line of intersection of the planes $\vec{r}\cdot\left(2\hat{i}-7\hat{j}+4\hat{k}\right)=3$ and $3x-5y+4z+11=0,\quad$ and the point $(-$

Watch Video Solution

2. Find the equation of the plane passing thruogh the line of intersection of the planes x +2y + 3z = 2 and x - y + z= 3 , and at a distance $\frac{2}{\sqrt{3}}$ from point $(3, 1, -1)$.

Watch Video Solution

3. Find the angle between the line $\vec{r} = \left(2\hat{i} - \hat{j} + \hat{k}\right) + t\left(6\hat{i} + 2\hat{j} - 2\hat{k}\right)$ and the plane $\vec{r} \cdot \left(6\hat{i} + 3\hat{j} + 2\hat{k}\right.$

Watch Video Solution

4. Find the angle between the planes $\vec{r} \cdot \left(\hat{i} + \hat{j} - 2\hat{k}\right) = 3$ and $2x - 2y + z = 2$

Watch Video Solution

5. Find the equation of the plane which passes through the point $(3, 4, -1)$ and is parallel to the plane 2x - 3y + 5z + 7 = 0. Also, find the distance between the two planes.

Watch Video Solution

6. Find the length of the perpendicular from the point $(1, -2, 3)$ to the plane x - y + z = 5.

Watch Video Solution

7. Find the point intersection of the line $x - 1 = \frac{y}{2} = z + 1$ with the plane $2x - y + 2z = 2.$ Also, find the angle between the line and the plane.

Watch Video Solution

8. Find the coordinates of the foot of the perpendicular and length of the perpendicular from the point $(4, 3, 2)$ to the plane x + 2y + 3z = 2.

Watch Video Solution

Exercise 6 10 Choose The Correct Or The Most Suitable Answer From The Given Four Alternative

1. If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $\left[\vec{a}\ \vec{b}\ \vec{c}\right]$ is equal to

A. 2

B. -1

C. 1

D. 0

Answer:

Watch Video Solution

2. If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then

A. $\left[\vec{\alpha}, \vec{\beta}, \vec{\gamma}\right] = 1$

B. $\left[\vec{\alpha}, \vec{\beta}, \vec{\gamma}\right] = -1$

C. $\left[\vec{\alpha}, \vec{\beta}, \vec{\gamma}\right] = 0$

D. $\left[\vec{\alpha}, \vec{\beta}, \vec{\gamma}\right] = -2$

Answer: A::B::C

Watch Video Solution

3. If $\vec{a}\cdot\vec{b}=\vec{b}\cdot\vec{c},\vec{a}=0,$ then the value of $\left[\vec{a},\vec{b},\vec{c}\right]$ is

A. $\left|\vec{a}\right|\left|\vec{b}\right|\left|\vec{c}\right|$

B. $\frac{1}{3}\left|\vec{a}\right|\left|\vec{b}\right|\left|\vec{c}\right|$

C. 1

D. -1

Answer: A::B::C

Watch Video Solution

4. If $\vec{a},\vec{b},\vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$, and is parallel to $\vec{c}$ then $\vec{a}\times\left(\vec{b}\times\vec{c}\right)$ is equal to

A. $\vec{a}$

B. $\vec{b}$

C. $\vec{c}$

D. $\vec{0}$

Answer: B::C

Watch Video Solution

5. If $\left[\vec{a}, \vec{b}, \vec{c}\right] = 1,$ then the value of $\frac{\vec{a}\cdot\left(\vec{b}\times\vec{c}\right)}{\left(\vec{c}\times\vec{a}\right)\cdot\vec{a}} + \frac{\vec{b}\cdot\left(\vec{c}\times\vec{a}\right)}{\left(\vec{a}\times\vec{b}\right)\cdot\vec{c}} + \frac{\vec{c}\left(\vec{a}\times\vec{b}\right)}{\left(\vec{c}\times\vec{b}\right)\cdot\vec{a}}$ is

A. 1

B. -1

C. 2

D. 3

Answer: A

Watch Video Solution

6. The volume of the parallelepiped with its edges represented by the vectors $\hat{i} + \hat{j}, \hat{i} + 2\hat{j}, \hat{i} + \hat{j} + \pi\hat{k}$ is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. π

D. $\frac{\pi}{4}$

Answer:

Watch Video Solution

7. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $\left[\vec{a}, \vec{b}, \vec{a} \times \vec{b}\right] = \frac{\pi}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer:

Watch Video Solution

8. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = \hat{i} + \hat{j}, \vec{c} = \hat{i}$ and $\left(\vec{a} \times \vec{b}\right) \times \vec{c} = \lambda \vec{a} + \mu \vec{b}$, then the value of $\lambda + \mu$ is

A. 0

B. 1

C. 6

D. 3

Answer:

Watch Video Solution

9. If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $\left[\vec{a}, \vec{b}, \vec{c}\right] = 3$, then $\left\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\right\}^2$ is equal to

A. 81

B. 9

C. 27

D. 18

Answer: A

Watch Video Solution

10. If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors such that $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \dfrac{b + c}{\sqrt{2}}$, then the angle between $\vec{a}$ and $\vec{b}$ is

A. $\frac{\pi}{2}$

B. $\frac{3\pi}{4}$

C. $\frac{\pi}{4}$

D. π

Answer: C::D

Watch Video Solution

11. If the volume of the parallelpiped with $\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{c} \times \vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $\left(\vec{a} \times \vec{b}\right) \times \left(\vec{b} \times \vec{c}\right), \left(\vec{b} \times \vec{c}\right) \times \left(\vec{c} \times \vec{a}\right)$ and $\left(\vec{c} \times \vec{a}\right) \times \left(\vec{a}\right.$

as coterminous edges is,

A. 8 cubic units

B. 512 cubic units

C. 64 cubic units

D. 24 cubic units

Answer: B::C::D

Watch Video Solution

12. Consider the vectors, $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ such that $\left(\vec{a} \times \vec{b}\right) \times \left(\vec{c} \times \vec{d}\right) = \vec{0}$ Let P_1 and P_2 be the planes determined by the pairs of vectors, $\vec{a}, \vec{b}$ and $\vec{c}, \vec{d}$ respectively. Then the angle between P_1 and P_2 is

A. 0°

B. 45°

C. 60°

D. 90°

Answer:

Watch Video Solution

13. If $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \left(\vec{a} \times \vec{b}\right) \times \vec{c}$, where $\vec{a}, \vec{b}\,\vec{c}$ are any three vectors such that $\vec{b} \cdot \vec{c} \neq 0$ and $\vec{a} \cdot \vec{b} \neq 0$, then $\vec{a}$ and $\vec{c}$ are

A. perpendicular

B. parallel

C. inclined at an angle $\frac{\pi}{3}$

D. inclined at an angle $\frac{\pi}{6}$

Answer: A::B::C::D

Watch Video Solution

14. If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}, \vec{b} = \hat{i} + 2\hat{j} - 5\hat{k}, \vec{c} = 3\hat{i} + 5\hat{j} - \hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is

A. $-17\hat{i} + 21\hat{j} - 97\hat{k}$

B. $17\hat{i} + 21\hat{j} - 97\hat{k}$

C. $-17\hat{i} - 21\hat{j} + 97\hat{k}$

D. $-17\hat{i} - 21\hat{j} - 97\hat{k}$

Answer: A::B

Watch Video Solution

15. The angle between the lines $\frac{x-2}{3} = \frac{y+1}{-2}, z = 2$ and $\frac{x-1}{1} = \frac{2y+3}{3}, \frac{z+5}{2}$ is

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: B

Watch Video Solution

16. If the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$ lies in the plane $x + 3y - az + \beta = 0$ then (

is

A. $(-5, 5)$

B. $(-6, 7)$

C. $(5, -5)$

D. $(6 - 7)$

Answer:

Watch Video Solution

17. The angle between the lines $\vec{r} = \left(\hat{i} + 2\hat{j} - 3\hat{k}\right) + t\left(2\hat{i} + \hat{j} - 2\hat{k}\right)$ and the plane $\vec{r} \cdot \left(\hat{i} + \hat{j}\right) + 4 =$

is

A. 0°

B. 30°

C. 45°

D. 90°

Answer: D

Watch Video Solution

18. The coordinates of the point where the line $\vec{r} = (6i - j - 3k) + t(-i + 4k)$ meets the plane $\vec{r} \cdot \left(\hat{i} + \hat{j} - \hat{k}\right) = 3$ are

A. $(1, 2, -6)$

B. $(7, -1, -7)$

C. $(1, 2, -6)$

D. $(5, -1, 1)$

Answer: A

Watch Video Solution

19. Distance from the origin to the plane 3x - 6y + 2z + 7 = 0 is

A. 0

B. 1

C. 2

D. 3

Answer: A

Watch Video Solution

20. The distance between the planes x + 2y + 3z + 7 = 0 and 2x + 4y + 6z + 7 = 0 is

A. $\frac{\sqrt{7}}{2\sqrt{2}}$

B. $\frac{7}{2\sqrt{14}}$

C. $\frac{\sqrt{7}}{2}$

D. $\frac{7}{2\sqrt{2}}$

Answer: B

Watch Video Solution

21. If direction cosines of a line are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}, \quad \text{then.}$

A. $c = \pm 3$

B. $c = \pm \sqrt{3}$

C. $c > 0$

D. $0 < c < 1$

Answer: C

Watch Video Solution

22. The vector equation $\vec{r} = \left(\hat{i} - 2\hat{j} - \hat{k}\right) + t\left(6\hat{j} - \hat{k}\right)$ represents a straight line passing through the points

A. $(0, 6, -1)$ and $(1, -2, -1)$

B. $(0, 6, -1)$ and $(-1, -4, -2)$

C. $(1, -2, -1)$ and $(1, 4, -2)$

D. $(1, -2, -1)$ and $(0, -6, 1)$

Answer: A::B::D

Watch Video Solution

23. If the distance of the point $(1, 1, 1)$ from the origin is half of its distance from the plane x + y + z + k = 0, then the value of k are

A. ± 3

B. ± 6

C. $-3, 9$

D. 3,-9

Answer: C

Watch Video Solution

24. If the planes $\overrightarrow{r}\cdot\left(2\hat{i}-\lambda\hat{j}+\hat{k}\right)=3$ and $\overrightarrow{r}\left(4\hat{i}+\hat{j}-\mu\hat{k}\right)=5$ are parallel, then the value of λ and μ are

A. $\frac{1}{2}, \ -2$

B. $-\frac{1}{2}, 2$

C. $-\frac{1}{2}, \ -2$

D. $\frac{1}{2}, 2$

Answer: A::B

Watch Video Solution

25. If the length of the perpendicular from the origin to the plane $2x + 3y + \lambda z = 1, \lambda > 0$ is $\frac{1}{5}$ then the value of is λ is

A. $2\sqrt{3}$

B. $3\sqrt{2}$

C. 0

D. 1

Answer: B::C

Watch Video Solution

Additional Questions Choose The Correct Or The Most Suitable Answer From The Given Four Alternatives

1. The vector, $2\hat{i} + \hat{j} + 2\hat{k}, \hat{i} + \lambda\hat{j} - \hat{k}t$ and $2\hat{i} - \lambda\hat{k}$ are co-planar if

A. $\lambda = -2$

B. $\lambda = 1 + \sqrt{3}$

C. $\lambda = 1 - \sqrt{3}$

D. $\lambda = -2, 1 \pm \sqrt{3}$

Answer: A::B::C::D

View Text Solution

2. Let $\vec{a}$, $\vec{b}$ and $\vec{c}$ be three non-coplanar vectors and let $\vec{p}$, $\vec{q}$, $\vec{r}$ be the vectors defined by the relations $\vec{p} = \frac{\vec{b} \times \vec{c}}{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}, \vec{q} = \frac{\vec{c} \times \vec{a}}{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}, \vec{r} = \frac{\vec{a} \times \vec{b}}{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}$ Then the value of $($

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

3. The number of vectors of unit length perpedicular to the vectors $\left(\hat{i}+\hat{j}\right)$ and $\left(\hat{j}+\hat{k}\right)$ is

A. 1

B. 2

C. 3

D. ∞

Answer: B

Watch Video Solution

4. If

$\overrightarrow{d}=\overrightarrow{a}\times\left(\overrightarrow{b}\times\overrightarrow{c}\right)+\overrightarrow{b}\times\left(\overrightarrow{c}\times\overrightarrow{a}\right)+\overrightarrow{c}\times\left(\overrightarrow{a}\times\overrightarrow{b}\right),\ \text{then}$

A. $\left|\vec{d}\right| = 1$

B. $\vec{d} = \vec{a} + \vec{b} + \vec{c}$

C. d = 0

D. a, b, c are coplanar

Answer: D

Watch Video Solution

5. If $\vec{a}$ and $\vec{b}$ are two unit vectors, then the vectors $\left(\vec{a} + \vec{b}\right) \times \left(\vec{a} \times \vec{b}\right)$ is parallel to the vector

A. $\vec{a} - \vec{b}$

B. $\vec{a} + \vec{b}$

C. $2\vec{a} - \vec{b}$

D. $2\vec{a} + \vec{b}$

Answer:

Watch Video Solution

6. The area of the parallelogram having diagonals $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4k$ is

A. 4

B. $2\sqrt{3}$

C. $4\sqrt{3}$

D. $5\sqrt{3}$

Answer: C

Watch Video Solution

7. If $\vec{a}, \vec{b}$ and $\vec{c}$ are any three vectors, then $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \vec{a} \times \left(\vec{b} \times \vec{c}\right)$ if and only if

A. $\vec{b}, \vec{c}$ are collinear

B. $\vec{a}$ and $\vec{c}$ are collinear

C. $\vec{a}$ and $\vec{b}$ are collinear

D. none

Answer: A::C::D

View Text Solution

8. The volume of the parallelepiped whose sides are given by $\overline{OA} = 2\hat{i} - 3\hat{j}, \overline{OB} = \hat{i} + \hat{j} - \hat{k}$ and $\overline{OC} = 3\hat{i} - \hat{k}$ is

A. $\frac{4}{13}$

B. 4

C. $\frac{2}{7}$

D. $\frac{4}{9}$

Answer: D

Watch Video Solution

9. If $\left|\vec{a}\right| = \left|\vec{b}\right| = 1$ such that $\vec{a} + 2\vec{b}$ and $5\vec{a} - 4\vec{b}$ are perpendicular to each other, then the angle between $\vec{a}$ and $\vec{b}$ is

A. 45°

B. 60°

C. $\cos^{-1}\frac{1}{3}$

D. $\cos^{-1}\frac{2}{7}$

Answer:

Watch Video Solution

10. The angle between the vector $3\hat{i} + 4\hat{j} + 5\hat{k}$ and the z-axis is

A. 30°

B. 60°

C. 45°

D. 90°

Answer: D

Watch Video Solution

11. A vector $\overrightarrow{OP}$ makes 60° and 45° with the positive direction of the x and y axes respectively. Then the angle between $\overrightarrow{OP}$ and the z-axis is

A. 75°

B. 60°

C. 45°

D. 3

Answer:

Watch Video Solution

12. If $\overrightarrow{a} = \hat{i} + 2\hat{j} + 3\hat{k}, \overrightarrow{b} = -\hat{i} + 2\hat{j} + \hat{k}, \overrightarrow{c} = 3\hat{i} + \hat{j}$ then $\overrightarrow{a} + t\overrightarrow{b}$ will be perpendicular to $\overrightarrow{c}$ only when t =

A. 5

B. 4

C. 8

D. $\frac{7}{3}$

Answer: C

Watch Video Solution

13. If θ is the between the vector $\overrightarrow{a}$ and $\overrightarrow{b}$, then $\sin\theta$ is

A. $\frac{\overrightarrow{a}.\overrightarrow{b}}{\left|\overrightarrow{a}\right|\left|\overrightarrow{b}\right|}$

B. $\frac{\left|\overrightarrow{a} \times \overrightarrow{b}\right|}{\overrightarrow{a}.\overrightarrow{b}}$

C. $\sqrt{\left(1-\left(\frac{\vec{a}.\vec{b}}{|\vec{a}||\vec{b}|}\right)^2\right.}$

D. 0

Answer: A::B::C

Watch Video Solution

14. If the vectors $\hat{i}+\hat{j}+2\hat{k}, -\hat{i}+2\hat{k}and2\hat{i}+x\hat{j}-y\hat{k}$ are mutually orthogonal, then the values of x, y, z are

A. $(10, 4, 1)$

B. $(-10, 4, 1)$

C. $\left(-10, -4, \frac{1}{2}\right)$

D. $\left(-10, 4, \frac{1}{2}\right)$

Answer: A::B::D

View Text Solution

15. If $\vec{a} = |\vec{a}|\vec{e}$ then $\vec{e} . \vec{e}$ is

A. 0

B. e

C. 1

D. $\vec{0}$

Answer: A

Watch Video Solution

16. The value of $\left|\vec{a} + \vec{b}\right|^2 + \left|\vec{a} - \vec{b}\right|^2$ is

A. $2\left(\left|\vec{a}\right|^2 + \left|\vec{b}\right|^2\right)$

B. $4\vec{a} . \vec{b}$

C. $2\left(\left|\vec{a}\right|^2 - \left|\vec{b}\right|^2\right)$

D. $4\left|\vec{a}\right|^2 - \left|\vec{b}\right|^2$

Answer: A::B::C

Watch Video Solution

17. If

$$\overrightarrow{p} \times \overrightarrow{q} = 2\hat{i} + 3\hat{j}, \overrightarrow{r} \times \overrightarrow{s} = 3\hat{j} + 2\hat{k}, \quad \text{then} \quad \overrightarrow{p}. \left(\overrightarrow{q} \times \left(\overrightarrow{r} \times \overrightarrow{s}\right)\right)$$

is

A. 9

B. 6

C. 2

D. 5

Answer:

Watch Video Solution

18. If the work done by a force $\overline{F} = \hat{i} + m\hat{j} + \hat{k}$ in moving the point of application from $(1, 1, 1)$ to $(3, 3, 3)$ along a straight is 12 units, then m is

A. 5

B. 2

C. 4

D. 6

Answer:

Watch Video Solution

19. The two planes 3x + 3y - 3z - 1 = 0 and x + y - z + 5 = 0 are

A. mutually perpendicular

B. parallel

C. inclined at 45°

D. inclined at 30

Answer: A::B::C::D

Watch Video Solution

20. The straight lines $\frac{x-3}{2}=\frac{y+5}{4}=\frac{z-1}{-13}$ and $\frac{x+1}{3}=\frac{y-4}{5}=\frac{z+2}{2}$ are

A. parallel

B. perpendicular

C. inclined at 45°

D. none

Answer: A::C::D

Watch Video Solution

21. For what value of $\left(\vec{a}\right)$ will the straight lines $\frac{x+2}{2}=\frac{y}{-3}=\frac{z-1}{4}$ and $\frac{x-3}{a}=\frac{y-1}{4}=\frac{z-7}{a}$ be perpendicular?

A. 1

B. 2

C. 3

D. -3

Answer: B

Watch Video Solution

22. If $\left[\vec{a}, \vec{b}, \vec{c}\right]=3$ and $\left|\vec{c}\right|=1$ then $\left|\left(\vec{b}\times\vec{c}\right)\times\left(\vec{c}\times\vec{a}\right)\right|$ is

A. 1

B. 3

C. 6

D. 9

Answer: C

View Text Solution

23. If $\lambda\hat{i} + 2\lambda\hat{j} + 2\lambda\hat{k}$ is a unit vector,then the value of λ is

A. $\pm\frac{1}{3}$

B. $\pm\frac{1}{4}$

C. $\pm\frac{1}{9}$

D. $\frac{1}{2}$

Answer: A::C

Watch Video Solution

24. For any three vectors $\vec{a}, \vec{b}$ and $\vec{c}$, $\left(\vec{a}+\vec{b}\right).\left(\vec{b}+\vec{c}\right)\times\left(\vec{c}+\vec{a}\right)$ is

A. 0

B. $\left[\vec{a}, \vec{b}, \vec{c}\right]$

C. $2\left[\vec{a}, \vec{b}, \vec{c}\right]$

D. $\left[\vec{a}, \vec{b}, \vec{c}\right]^2$

Answer: A::B::C

Watch Video Solution

25. If the vector $a\hat{i}+\hat{j}+\hat{k}, \hat{i}+b\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+c\hat{k}(a\neq b\neq c\neq 1)$ are coplanar, then $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}=$

A. 0

B. 1

C. 2

D. $\frac{abc}{(1-a)(1-b)(1-c)}$

Answer: A

Watch Video Solution

Additional Questions Ii Fill In The Blanks

1. The angle between the planes 2x + y - z = 9 and x + 2y + z = 7 is ....

A. $\cos^{-1}(5/6)$

B. $\cos^{-1}(5/36)$

C. $\cos^{-1}(1/2)$

D. $\cos^{-1}(1/12)$

Answer: A::B::C

Watch Video Solution

2. The unit normal vector to the plane 2x + 3y + 4z =5 is ....

A. $\frac{2}{\sqrt{29}}\hat{j} + \frac{3}{\sqrt{29}}\hat{j} + \frac{4}{\sqrt{29}}\hat{k}$

B. $\frac{2}{\sqrt{29}}\hat{j} - \frac{3}{\sqrt{29}}\hat{j} + \frac{4}{\sqrt{29}}\hat{k}$

C. $\frac{2}{\sqrt{29}}\hat{j} - \frac{3}{\sqrt{29}}\hat{j} - \frac{4}{\sqrt{29}}\hat{k}$

D. $\frac{2}{5}\hat{j} + \frac{3}{5}\hat{j} + \frac{4}{5}\hat{k}$

Answer: A::B::C::D

Watch Video Solution

3. The work done by the force $\overline{F} = \hat{i} + \hat{j} + \hat{k}$ acting on a particle, if the particle is displaced from $A(3, 3, 3)$ to the point B(4,4,4)` is .... units.

A. 2

B. 3

C. 4

D. 7

Answer: C

Watch Video Solution

4. The angle between the vectors $\hat{i} - \hat{j}$ and $\hat{j} - \hat{k}$ is ....

A. $\frac{\pi}{3}$

B. $\frac{-2\pi}{3}$

C. $\frac{-\pi}{3}$

D. $\frac{2\pi}{3}$

Answer: B::C

Watch Video Solution

5. The unit normal vector to the plane 2x - y + 2z = 5 are ....

A. $2\hat{i} - \hat{j} + 2\hat{k}$

B. $\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$

C. $-\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$

D. $\pm\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$

Answer: A::B::C

Watch Video Solution

6. The distance from the origin to he plane $\vec{r}\left(2\hat{i} - \hat{j} + 5\hat{k}\right) = 7$ is ....

A. $\frac{7}{\sqrt{30}}$

B. $\frac{\sqrt{30}}{7}$

C. $\frac{30}{7}$

D. $\frac{7}{30}$

Answer: C

Watch Video Solution

7. If vec(a),vec(b),vec(c),are mutually perpendicular unit vectors,then $\left|\vec{a}+\vec{b}+\vec{c}\right|$ is ....

A. 3

B. 9

C. $3\sqrt{3}$

D. $\sqrt{3}$

Answer: C

Watch Video Solution

8. Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u}+\vec{v}+\vec{w}=\vec{0}$. If abvec(u)=3,absve

is ....

A. 25

B. -25

C. 5

D. $\sqrt{5}$

Answer: B

Watch Video Solution

9. The length of the $\perp^r$ from the origin to plane $\overrightarrow{r}.\left(3\hat{i}+4\hat{j}+12\hat{k}\right)=26$ is ....

A. 2

B. $\frac{1}{2}$

C. 26

D. $\frac{26}{169}$

Answer: A::B

Watch Video Solution

10. If $\left|\vec{a}\times\vec{b}\right| = \vec{a}.\vec{b}$, then angle between the vector $\vec{a}$ and $\vec{b}$ is ....

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{2}$

Answer: D

Watch Video Solution

11. The value of $\left|\vec{a}+\hat{i}\right|^2+\left|\vec{a}+\vec{j}\right|^2+\left|\vec{a}+\vec{k}\right|^2$ if $|a|=1$ is ....

A. 0

B. 1

C. -1

D. 3

Answer: B

View Text Solution

12. If $\vec{a}, \vec{b}, \vec{c}$ are the non-coplanar vectors, then $\dfrac{\vec{a}\,.\,\vec{b} \times \vec{c}}{\vec{c} \times \vec{a}\,.\,\vec{b}} + \dfrac{\vec{b}\,.\,\vec{a} \times \vec{c}}{\vec{c}\,.\,\vec{a} \times \vec{b}} =$ ....

A. 0

B. 1

C. -1

D. $\dfrac{\vec{a}\,.\,\vec{b} \times \vec{c}}{\vec{b} \times \vec{c}\,.\,\vec{c}}$

Answer:

Watch Video Solution

13. If $\vec{d} = \lambda\left(\vec{a} \times \vec{b}\right) + \mu\left(\vec{b} \times \vec{c}\right) + \omega\left(\vec{c} \times \vec{a}\right)$ and $\left|\vec{c} \times \vec{a}\right| = \frac{1}{8}$ the

is ....

A. 0

B. 1

C. 8

D. $8\vec{d} \cdot \left(\vec{a} + \vec{b} + \vec{c}\right)$

Answer: A::B::C::D

Watch Video Solution

14. The area of the parallelogram having diagonals $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4k$ is

A. 4

B. $2\sqrt{3}$

C. $4\sqrt{3}$

D. $5\sqrt{3}$

Answer: C

Watch Video Solution

15. Let $\vec{a}, \vec{b}$, and $\vec{c}$ be three vectors having magnitudes 1,1,2 respectively.

If $\vec{a} \times \left(\vec{a} \times \vec{c}\right) + \vec{b} = 0$, then the acute angle between $\vec{a}$ and $\vec{c}$ is ....

A. 0

B. $\frac{\pi}{3}$

C. '(pi)/(6)'

D. $\frac{2\pi}{3}$

Answer: C::D

Watch Video Solution

Watch Video Solution

Additional Questions Iii Choose The Odd Man Out

1. Choose the odd man out :

A. displacement

B. length

C. weight

D. velocity

Answer: C

Watch Video Solution

2. For any non-zero vectors $\vec{a}$ and $\vec{b}$ $\vec{a} \times \vec{b}$ is

A. cross product of $\vec{a}$ and $\vec{b}$

B. $\left|\vec{a}\right|\left|\vec{b}\right|\sin\theta$

C. $\left|\vec{a}\right|\left|\vec{b}\right|\sin\theta\hat{n}$

D. $-\left(\vec{b}\times\vec{a}\right).\vec{a}$

Answer: A::B::C

Watch Video Solution

3. For any non-zero vectors $\vec{a}, \vec{b}$ and $\vec{c}, \left(\vec{a}\times\vec{b}\right).\vec{c}$ is

A. $\vec{a}.\left(\vec{b}\times\vec{c}\right)$

B. $\left(\vec{b}\times\vec{c}\right).\vec{c}$

C. $\left(\vec{b}\times\vec{c}\right).\vec{a}$

D. $\left(\vec{c}\times\vec{a}\right).\vec{c}$

Answer: B::C

Watch Video Solution

4. $\vec{a}$, $\vec{b}$ and $\vec{c}$ are said to be colpanar if

A. $\left[\vec{a}, \vec{b}, \vec{c}\right] = 0$

B. $\vec{a}, \vec{b}, \vec{c}$ lie on the same plane

C. They are either parallel or intersecting

D. Skew lines

Answer:

Watch Video Solution

5. The equation of the plane at a distance P from the origin and perpendicular to the unit normal vector $\hat{d}$ is

A. $\vec{r} . \vec{d} = p$

B. $\vec{r} . \hat{d} = p$

C. $\vec{r} . \vec{d} = q$ where $q = p\left|\vec{d}\right|$

D. $\vec{r} \cdot \frac{\vec{d}}{\left|\vec{d}\right|} = p$

Answer: C::D

Watch Video Solution

Additional Questions Iv Choose The Incorrect Statement

1. For the line $\frac{x-6}{6} = \frac{y+4}{4} = \frac{z-4}{8}$,

A. $(6, -4, 4)$ lies on the line

B. $(6, 4, 8)$ are its direction ratios

C. 6,4,8 are its direction cosines

D. 3,2,4 are its direction ratios

Answer: A::C::D

Watch Video Solution

2. For the plane $\vec{r}.\left(2\hat{i}+3\hat{j}+5\hat{k}\right)=3$

A. the normal vector is $2\hat{i}+3\hat{j}+5\hat{k}$

B. the plane is $\perp$ to the vector $2\hat{i}+3\hat{j}+5\hat{k}$

C. cartesain equation is 2x + 3y +5z = 3

D. the plane is parallel to the vector $2\hat{i}+3\hat{j}+5\hat{k}$

Answer: A::B::C::D

Watch Video Solution

3. The point of inersection of the line $\vec{r}=\left(\hat{i}-\hat{k}\right)+t\left(3\hat{i}+2\hat{j}+7\hat{k}\right)$ and the plane $\vec{r}=\left(\hat{i}+\hat{j}-\hat{k}\right)=8$ is

A. $(8, 6, 22)$

B. $(3t+1, 2t, 7t-1)$ for some value of t

C. $(-8, -6, -22)$

D. $\frac{x-1}{3} = \frac{y-0}{2} = \frac{z+1}{7} = \text{ for some value of t}$

Answer: B

View Text Solution

4. If a line makes $\alpha = 45^\circ$,beta=60^(@) $withpositivedirectionofa\xi sx \text{ and } y, thenthe\angle itmakeswiththez - a\xi s$ (gamma)` is

A. 60°

B. $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 1$

C. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

D. $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$

Answer: A::B

View Text Solution

5. If $\overline{PR} = 2\hat{i} + \hat{j} + \hat{k}, \overline{QS} = \hat{i} + 3\hat{j} + 2\hat{k}$, then the area of the quadrilateral PQRS is

A. $\frac{5\sqrt{3}}{2}$

B. $\frac{1}{2}|\overline{PR} \times \overline{QS}|$

C. $\frac{1}{2}(\overline{PR} \times \overline{QS})$

D. $\frac{1}{2}\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 1 & 1 \\ -1 & 3 & 2 \end{vmatrix}$

Answer: A::B

Watch Video Solution

Additional Questions 2 Marks

1. If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}, \vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$ find λ such tha

is perpendicular to $\vec{c}$.

Watch Video Solution

2. A force of magnitude 6 units acting parallel to $2\hat{i}-2\hat{j}+\hat{k}$ displace the point of application from $(1, 2, 3)\ \text{ to }\ (5, 3, 7)$. Find the work done.

Watch Video Solution

3. Find the area of the triangle whose vertices are A (3,-1,2), B(1,-1,-3) and C(4,-3,1).

Watch Video Solution

4. Forces $2\hat{i}+7\hat{j}, 2\hat{i}-5\hat{j}+6\hat{k}, -\hat{i}+2\hat{j}-\hat{k}$ act at a point P whose position vector is $\overrightarrow{4}-3\hat{j}-2\hat{k}$. Find the vector moment of the resultant of these forces acting at P about this Point Q whose position vector is $6\hat{i}+\hat{j}-3\hat{k}$

Watch Video Solution

5. Find the Cartesian equation of a line passing through the points $A(2, -1, 3)$ and $B(4, 2, 1)$

Watch Video Solution

6. Find the parametric form of vector equation of a line passing through a point $(2, -1, 3)$ and parallel to line $\vec{r} = (\hat{i} + \hat{j}) + t(2\hat{i} + \hat{j} - 2\hat{k})$

Watch Video Solution

7. Find the parametric form of vector equation of the plane passing through the point $(1, -1, 2)$ having 2,3,3 as direction ratio of normal to the plane.

Watch Video Solution

8. If the planes $\vec{r}.(\hat{i} + 2\hat{j} + 3\hat{k}) = 7$ and $\vec{r}.(\lambda\hat{i} + 2\hat{j} - 7\hat{k}) = 26$ are perpendicular. Find the value of λ.

Watch Video Solution

9. Find the equation of the plane containing the line of intersection of the planes x + y + z - 6 = 0 and 2x + 3y + 4z + 5 = 0 and passing through the point $(1, 1, 1)$

Watch Video Solution

10. If the planes $\overrightarrow{r}.\left(\hat{i}+2\hat{j}+3\hat{k}\right)=7$ and $\overrightarrow{r}.\left(\lambda\hat{i}+2\hat{j}-7\hat{k}\right)=26$ are perpendicular. Find the value of λ.

Watch Video Solution

Additional Questions 3 Marks

1. Dot product of a vector with vector $3\hat{i}-5\hat{k}, 2\hat{i}+7\hat{j}$ and $\hat{i}+\hat{j}+\hat{k}$ are respectively -1,6 and 5. Find the vector.

Watch Video Solution

2. Find the Cartesian form of the equation of the plane $\overrightarrow{r} = (s - 2t)\hat{i} + (3 - t)\hat{j}(2s + t)\hat{k}$

Watch Video Solution

3. Find the equation of the plane through the intersection of the planes 2x - 3y + z - = 0 and x - y + z + 1 = 0 and perpendicular to the plane x + 2y - 3z + 6 = 0.

Watch Video Solution

4. Find the angle between the line $\frac{x-2}{3} = \frac{y-1}{-1} = \frac{z-3}{2}$ and the plane $3x + 4y + z + 5 = 0.$

Watch Video Solution

5. If $\vec{a} = \hat{i} - \hat{j}, \vec{b} = \hat{j} - \hat{k}, \vec{c} = \hat{k} - \hat{i}$ then find $\left[\vec{a} - \vec{b}, \vec{b} - \vec{c}, \vec{c} - \vec{a}\right.$

Watch Video Solution

6. Prove that $\left[\vec{a} + \vec{b} + \vec{c}, \vec{b} + \vec{c}, \vec{c}\right] = \left[\vec{a}\vec{b}\vec{c}\right]$

Watch Video Solution

7. Prove by vector method, that in a right angled triangle the square of h

the hypotenuse is equal to the sum of the square of the other two sides.

Watch Video Solution

8. If $\vec{a} + \vec{b} + \vec{c} = 0, \quad \text{then show that} \quad \vec{a} \times \vec{b} = \vec{b} \times \vec{c} = \vec{c} \times \vec{a}$

Watch Video Solution

9. Show that four points whose position vectors are given $6\hat{i}-7\hat{j}; 16\hat{i}-19\hat{i}-4\hat{k}; 3\hat{i}-6\hat{k}; 2\hat{i}-5\hat{j}+10\hat{k}$ are co-planar

Watch Video Solution

10. Show that the lines $\frac{x-1}{3}=\frac{y+1}{2}=\frac{z-1}{5}$ and $\frac{x+2}{4}=\frac{y-1}{3}=\frac{z+1}{-2}$ do not intersect.

Watch Video Solution

Additional Questions 5 Marks

1. Show that the points A, B, C with position vector $2\hat{i}-\hat{j}+\hat{k}, \hat{i}-3\hat{j}-5\hat{k}$ and $3\hat{i}-4\hat{j}+4\hat{k}$ respectively are the vector of a right angled triangle. Also, find the remaining angles of the triangle.

Watch Video Solution

2. ABCD is a quadrilateral with $\overline{AB} = \overline{\alpha}$ and $\overline{AD} = \bar{\beta}$ and $\overline{AC} = 2\overline{\alpha} + 3\bar{\beta}$. If the area of the quadrilateral is λ times the area of the parallelogram with $\overline{AB}$ and $\overline{AD}$ as adjacent sides, then prove that $\lambda = \frac{5}{2}$

Watch Video Solution

3. If $\left|\vec{A}\right| = \hat{i} + \hat{j} + \hat{k}$ and $\left|\vec{C}\right| = \hat{j} - \hat{k}$ are two given vector, then find a vector B satisfying the equation $\vec{A} \times \vec{B} = \vec{C}$ and $\vec{A} \cdot \vec{B} = 3$

Watch Video Solution

4. Find the shortest distance berween the following pairs of lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x-3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$

Watch Video Solution

5. Find the vector and Cartesian equations of the plane passing through the point $(1, 1, -1)$ and perpendicular to the planes x + 2y + 3z - 7 = 0 and 2x - 3y + 4z = 0

Watch Video Solution