MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

VECTOR AND 3D - PREVIOUS YEAR QUESTIONS

Exercise

1. Let veca=2hati+hatj-2hatk and vecb=hati+hatj. If vecc$isa\overrightarrow{\longrightarrow}rsucht\hat{}$ veca.vecc=|vecc|,|vecc-veca|=2sqrt(2) and $the\angle between$(vecaxxvecb) and veccispi/6$then$|(vecaxxvecb)xvec|=$(A)\frac{2}{3}$ (B) $\frac{1}{2}$ (C) $\frac{3}{2}$ (D) 1

Watch Video Solution

2. Let $e\overrightarrow{a}=\hat{i}+\hat{j}-\hat{k},\overrightarrow{b}=\hat{i}-\hat{j}+\hat{k}$ and $\overrightarrow{c}$ be as unit vector perpendicular to veca and vecbthevecc=(A)1/sqrt(j+k)(B)1/sqrt(2)(j-k)

(C)1/sqrt(6) (i-2jk)(D)1/sqrt(6) (2i-j+k)`

Watch Video Solution

3. ABCDEF is a regular hexagon with centre a the origin such that $\overrightarrow{AB}+\overrightarrow{EB}+\overrightarrow{FC}=\lambda\overrightarrow{ED}$ then $\lambda=$ (A) 2 (B) 4 (C) 6 (D) 3

Watch Video Solution

4. A non vector $\overrightarrow{a}$ is parallel to the line of intersection of the plane determined by the vectors $\hat{i}, \hat{i}+\hat{j}$ and thepane determined by the vectors $\hat{i}-\hat{j}, \hat{i}+\hat{k}$ then angle between $\overrightarrow{a}$ and $\hat{i}-2\hat{j}+2\hat{k}$ is = (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{4}$

Watch Video Solution

5. If $\vec{a}$ and $\vec{b}$ are vectors in space given by $\vec{a} = \frac{\hat{i} - 23\hat{j}}{\sqrt{5}}$ $\vec{b} = \frac{2\hat{i} + \hat{j} + 3\hat{k}}{\sqrt{14}}$ then the value of $\left(2\vec{a} + \vec{b}\right).\left[\left(\vec{a} \times \vec{b}\right) \times \left(\vec{a} - 2\vec{b}\right)\right]$, is

Watch Video Solution

6. Let P, Q, R and S be the points on the plane with position vectors $-2i - j, 4i, 3i + 3jand - 3j + 2j,$ respectively. The quadrilateral $PQRS$ must be a Parallelogram, which is neither a rhombus nor a rectangle Square Rectangle, but not a square Rhombus, but not a square

Watch Video Solution

7. Two adjacent sides of a parallelogram $ABCD$ are given by $\vec{A}B = 2\hat{i} + 10\hat{j} + 11\hat{k}and\vec{A}D = -\hat{i} + 2\hat{j} + 2\hat{k}\cdot$ The side AD is rotated by an acute angle α in the plane of the parallelogram so that

AD becomes AD'. If AD' makes a right angle with the side AB, then the cosine of the angel α is given by $\frac{8}{9}$ b. $\frac{\sqrt{17}}{9}$ c. $\frac{1}{9}$ d. $\frac{4\sqrt{5}}{9}$

Watch Video Solution

8. Let $\vec{a} = -\hat{i} - \hat{k}, \vec{b} = x\hat{i} + \hat{j} + (1-x)\hat{k} nad \vec{c} = y\hat{i} + x\hat{j} + (1+x-y)\hat{}$

Then $\left[\vec{a}\,\vec{b}\,\vec{c}\right]$ depends (A) only x (B) only y (C) neither x or nor y (D) both x and y

Watch Video Solution

9. If $\vec{a}$, $\vec{b}$ and $\vec{c}$ are three vectors of which every pair is non colinear. If the vector $\vec{a} + \vec{b}$ and $\vec{b} + \vec{c}$ are collinear with the vector $\vec{c}$ and $\vec{a}$ respectively then which one of the following is correct? (A) $\vec{a} + \vec{b} + \vec{c}$ is a nul vector(B)veca+vecb+vecc$isaunit \overrightarrow{} r(C)$veca+vecb+vecc $isa \overrightarrow{} rofmagnitude2units(D)$veca+vecb+vecc` isd a vector of magnitude 3 units

Watch Video Solution

10. If $\vec{a}=\frac{1}{\sqrt{10}}\left(3\hat{i}+\hat{k}\right), \vec{b}=\frac{1}{7}\left(2\hat{i}+3\hat{j}-6\hat{k}\right)$, then the value of $\left(2\vec{a}-\vec{b}\right).\left\{\left(\vec{a}\times\vec{b}\right)\times\left(\vec{a}+2\vec{b}\right)\right\}$ is

Watch Video Solution

11. The vectors $\vec{a}$ and $\vec{b}$ are not perpendicular and $\vec{a}\,c$ and $\vec{d}$ are two vectors satisfying : $\vec{b}\times\vec{c}=\vec{b}\times\vec{d}$ and $\vec{a}.\vec{d}=0.$ Then the $\vec{d}$ is equal to (A) $\vec{c}+\frac{\vec{a}.\vec{c}}{\vec{a}.\vec{b}}\Big)\vec{b}$ (B) $\vec{b}+\frac{\vec{b}.\vec{c}}{\vec{a}.\vec{b}}\Big)\vec{c}$ (C) $\vec{c}-\frac{\vec{a}.\vec{c}}{\vec{a}.\vec{b}}\Big)\vec{b}$ (D) $\vec{b}-\frac{\vec{b}.\vec{c}}{\vec{a}.\vec{b}}\Big)\vec{c}$

Watch Video Solution

12. If $\vec{a}$ is perpendicular to $\vec{b}$ then the vector $\vec{a}\times\left[\vec{a}\times\left\{\vec{a}\times\left(\vec{a}\times\vec{b}\right)\right\}\right]$ is equla (A) $\left|\vec{a}\right|^2\vec{b}$ (B) $\left|\vec{a}\right|\vec{b}$ (C)

$\left|\vec{a}\right|^3\vec{b}$ (D) $\left|\vec{a}\right|^4\vec{b}$

Watch Video Solution

13. If the vector $8\hat{i} + a\hat{j}$ of magnitude 10 is the directionn of the vector $4\hat{i} - 3\hat{j}$, then the value of a is equal to (A) 6 (B) 3 (C) -3 (D) -6

Watch Video Solution

14. If the angle between $\vec{a}$ and $\vec{c}$ is 25^0 the angle between $\vec{b}$ and $\vec{c}$ is 65^0 and $\vec{a} + \vec{b} = \vec{c}$, then the angle between $\vec{a}$ and $\vec{b}$ is (A) 40^0 (B) 115^0 (C) 25^0 (D) 90^0

Watch Video Solution

15. The positon vector of the centroid of the triangle ABC is $2i + 4j + 2k$. If the position vector of the vector A is

$2i + 6j + 4k.$, $thentheposition \overrightarrow{} rofmidp \oint ofBCis(A)$2i+3j+k$(B)$

2i+3jk(C)2i-3j-k(D)-2i-3j-k`

Watch Video Solution

16. The projection of the vector $2\hat{i} + a\hat{j} - \hat{k}$ the vector $\hat{i} - 2\hat{j} + \hat{k}is$ -5/sqrt(6)` then the value of a is equal to (A) 1 (B) 2 (C) -2 (D) 3

Watch Video Solution

17. Let $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}, \overrightarrow{b} = \hat{i} - \hat{j} + \hat{k}$ and $\overrightarrow{c} = \hat{i} - \hat{j} - \hat{k}$ be three vectors. A vectors $\overrightarrow{v}$ in the plane of $\overrightarrow{a}$ and $\overrightarrow{b}$, whose projection on $\overrightarrow{c} is \frac{1}{\sqrt{3}}$ is given by

Watch Video Solution

18. The vectors which is/are coplanar with vectors $\hat{i} + \hat{j} + 2\hat{k}$ and $\hat{i} + 2\hat{j} + \hat{k}$ and perpendicular to the vector $\hat{i} + \hat{j} + \hat{k}$

is /are (A) $\hat{j}-\hat{k}$ (B) $-\hat{i}+\hat{j}$ (C) $\hat{i}-\hat{j}$ (D) $-\hat{j}+\hat{k}$

Watch Video Solution

19. The angle between the line $\vec{r}=(\hat{i}+2\hat{j}+3\hat{k})=\lambda(2\hat{i}+3\hat{j}+4\hat{k})$ and the plane $\vec{r}.(\hat{i}+2\hat{j}-2\hat{k})=3$ is (A) 0^0 (B) 60^0 (C) 30^0 (D) 90^0

Watch Video Solution

20. The line $\vec{r}=\hat{i}+\hat{j}-\hat{k}+\lambda(3i-j)$ and $\vec{r}.=4\hat{i}-h*k+\mu(2\hat{i}+3\hat{k})$ interset at the point (A) (0,0,0) (B) (0,0,1) (C) (0,-4-1) (D) (4,0,-1)

Watch Video Solution

21. If $\vec{a}$ and $\vec{b}$ are vectors such that $\left|\vec{a}+\vec{b}\right|=\sqrt{29}$ and $\vec{a}\times(2\hat{i}+3\hat{j}+4\hat{k})=(2\hat{i}+3\hat{j}+4\hat{k})\times\vec{b}$, then possible value of $\left(\vec{a}+\vec{b}\right).\left(-7\hat{i}+2\hat{j}+3\hat{k}\right)$ is (A) 0 (B) 3 (C) 4 (D) 8

Watch Video Solution

22. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors satisfying $\left|\vec{a}-\vec{b}\right|^2+\left|\vec{b}-\vec{c}\right|^2+\left|\vec{c}-\vec{a}\right|^2=9$ then $\left|2\vec{a}+5\vec{b}+3\vec{c}\right|$ is

Watch Video Solution

23. Let $\overline{PR}=3\hat{i}+\hat{j}-2\hat{k}$ and $\overline{SQ}=\hat{i}-3\hat{j}-4\hat{k}$ determine diagonals of a parallelogram PQRS and $\overline{PT}=\hat{i}+2\hat{j}+3\hat{k}$ be another vector. Then the volume of the parallelepiped determined by the vectors $\overline{PT}, \overline{PQ}$ and $\overline{PS}$ is

Watch Video Solution

24. Consider the set of eight vector $V = \left\{a\hat{i} + b\hat{j} + c\hat{k}; a, bc \in \{-1, 1\}\right\}$. Three non-coplanar vectors can be chosen from V is 2^p ways. Then p is______.

Watch Video Solution

25. If $\vec{a}$ and $\vec{b}$ are non colinear vectors, then the value of α for which the vectors $\vec{u} = (\alpha - 2)\vec{a} + \vec{b}$ and $\vec{v} = (2 + 3\alpha)\vec{a} - 3\vec{b}$ are collinear is (A) $\frac{3}{2}$ (B) $\frac{2}{3}$ (C) $\frac{-3}{2}$ (D) $\frac{-2}{3}$

Watch Video Solution

26. If the vectors $\overrightarrow{AB} = 3\hat{i} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC, then the length of the median through A is (A) $\sqrt{33}$ (B) $\sqrt{45}$ (C) $\sqrt{18}$ (D) $\sqrt{720}$

Watch Video Solution

27. If $\vec{a} \perp \vec{b}$ and $\left(\vec{a} + \vec{b}\right) \perp \left(\vec{a} + m\vec{b}\right)$, then m= (A) -1 (B) 1 (C) $\frac{-1\vec{a}^2}{\vec{b}\Big|^2}$ (D) 0

Watch Video Solution

28. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0 then \vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a} =$ (A) $\frac{3}{2}$ (B) $-\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $\frac{1}{2}$

Watch Video Solution

29. If $\vec{a}$ is perpendiculasr to both $\vec{b}$ and $\vec{c}$ then (A) $\vec{a}.\left(\vec{b} \times \vec{c}\right) = \vec{0}$ (B) $\vec{a} \times \left(\vec{b}\, x\, \vec{c}\right) = \vec{0}$ (C) $\vec{a} \times \left(\vec{b} + \vec{c}\right) = \vec{0}$ (D) $\vec{a} + \left(\vec{b} + \vec{c}\right) = \vec{0}$

Watch Video Solution

30. If $\overrightarrow{p}$ and $\overrightarrow{q}$ are non collinear unit vectors $\left|\overrightarrow{p}+\overrightarrow{q}\right|=\sqrt{3} then \left(2\overrightarrow{p}-3\overrightarrow{q}\right).\left(3\overrightarrow{p}+\overrightarrow{q}\right)$ is equal to (A) 0 (B) $\frac{1}{3}$ (C) $-\frac{1}{3}$ (D) $-\frac{1}{2}$

Watch Video Solution

31. The triangle formed by the three points whose position vectors are $2\hat{i}+4\hat{j}-\hat{k}, 4\hat{i}+5\hat{j}+\hat{k}$ and $3\hat{i}+6\hat{j}-3\hat{k}$ is (A) an equilateral triangle (B) a right singled triangle but not sides (C) an isosceles triangle but not right angled triangle (D) a right angled isosceles triangle

Watch Video Solution

32. If $(1, 2, 4)$ and $(2, -\lambda, -3)$ are the initial and terminal points of the vector $\hat{i}+5\hat{j}-7\hat{k}$ then the value λ is equal to (A) 7 (B) -7 (C) -5 (D) 5

Watch Video Solution

33. Let $\vec{u} = 5\vec{a} + 6\vec{b} + 7\vec{c}, v = 7\vec{a} + \vec{b} + 9\vec{c}$ and $\vec{w} = 3\vec{a} + 20\vec{b} + 5\vec{c}$ where $\vec{a}, \vec{b}, \vec{c}$ are non zero vectors.If $\vec{u} = l\vec{v} + m\vec{w}$ then the values of l and m respectively are (A) $\frac{1}{2}, \frac{1}{2}$ (B) $\frac{1}{2}, -\frac{1}{2}$ (C) $-\frac{1}{2}, \frac{1}{2}$ (D) $\frac{1}{3}, \frac{1}{3}$

Watch Video Solution

34. If $3\vec{p} + 2\vec{q} = \hat{i} + \hat{j} + \hat{k}$ and $3\vec{p} - 2\vec{q} = \hat{i} - \hat{j} - \hat{k}$ then the angle between $\vec{p}$ and $\vec{q}$ is (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

Watch Video Solution

35. Equation of the plane containing the straighat line $\frac{x}{2} = \frac{y}{3} = \frac{z}{4}$ and perpendicular to the lane containing the straighat lines $\frac{x}{3} = \frac{y}{4} = \frac{z}{2}$ and $\frac{x}{4} = \frac{y}{2} = \frac{z}{3}$ is (A) $x + 2y - 2z = 0$ (B) $3x + 2y - 2z = 0$ (C) $x - 2y + z = 0$ (D) $5x + 2y - 4z = 0$

Watch Video Solution

36. If the distance between the plane Ax 2y + z = d and the plane containing the lines 2 1x = 3 2y = 4 3z and 3 2x = 4 3y = 5 4z is 6 , then |d| is

Watch Video Solution

37. A parallelopiped is formed by planes drawn through the point (2,2,5) and (5,9,7) parallel to the coordinte planes. The length of a diagonal of the parallelopiped is (A) 7 (B) 9 (C) 11 (D) $\sqrt{155}$

Watch Video Solution

38. If $P(x, y, z)$ is a point on the line segment joining $Q(2, 2, 4) and R(3, 5, 6)$ such that the projections of $\vec{O} P$ on te axes are 13/5, 19/5 and 26/5, respectively, then find the ratio in which P divides QR.

Watch Video Solution

39. If the angle between the line $x\frac{y-1}{2}=\frac{z-3}{\lambda}$ and the plane $x+2y+3z=4$ is $\cos^{-1}\left(\sqrt{\frac{5}{14}}\right)$, $then\lambda=$ (A) $\frac{2}{5}$ (B) $\frac{5}{3}$ (C) $\frac{2}{3}$ (D) $\frac{3}{2}$

Watch Video Solution

40. Find the equation of the plane passing through the points 1,0,0 and 0,2,0 and at a distance 6/7units from the origin

Watch Video Solution

41. IF the strasighrt line $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{0}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar then the value of k is (A) -3 (B) 0 (C) 1 (D) -2

Watch Video Solution

42. A line from the origin meets the lines $\frac{x-2}{1}=\frac{y-1}{-2}=\frac{z+1}{1}$ and $\frac{x-\frac{8}{3}}{2}=\frac{y+3}{-1}=\frac{z-1}{1}$ at P and Q respectively. If length $PQ=d$, then d^2 is

Watch Video Solution

43. Assertion: The point $A(3, 1, 6)$ is the mirror image of the point $B(1, 3, 4)$ in the plane $x-y+z=5$. Reason: The plane $x-y+z=5$ bisects the line segment joining $A(3, 1, 6)$ and $B(1, 3, 4)$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not the correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

Watch Video Solution

44. Assertion: The point $A(1, 0, 7)$ is the mirror image of the point $B(1, 6, 3)$ in the line $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ Reason: The line

$\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ bisects the segment joining `A(1,0,7) and B(1,6,3).

(A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

Watch Video Solution

45. The equation of a plane passing through the line of intersection of the planes x+2y+3z = 2 and x y + z = 3 and at a distance 2 3 from the point (3, 1, 1) is (A) 5x 11y + z = 17 (B) 2x y 3 2 1 (C) x + y + z = 3 (D) x 2y 1 2

Watch Video Solution

46. If the straight lines x 1 y 1 z 2 k 2 and x 1 y 1 z 5 2 k are coplanar, then the plane (s) containing these two lines is (are) (A) y + 2z = 1 (B) y + z = 1 (C) y z = 1 (D) y 2z = 1 55

Watch Video Solution

47. The point P is the intersection of the straight line joining the points $Q(2, 3, 5)$ and $R(1, -1, 4)$ with the plane $5x - 4y - z = 1$. If S is the foot of the perpendicular drawn from the point $T(2, 1, 4)$ to QR, then the length of the line segment PS is (A) $\frac{1}{\sqrt{2}}$ (B) $\sqrt{2}$ (C) 2 (D) $2\sqrt{2}$

Watch Video Solution

48. Perpendiculars are drawn from points on the line $\frac{x+2}{2} = \frac{y+1}{-1} = \frac{z}{3}$ to the plane $x + y + z = 3$ The feet of perpendiculars lie on the line (a) $\frac{x}{5} = \frac{y-1}{8} = \frac{z-2}{-13}$ (b) $\frac{x}{2} = \frac{y-1}{3} = \frac{z-2}{-5}$ (c) $\frac{x}{4} = \frac{y-1}{3} = \frac{z-2}{-7}$ (d) $\frac{x}{2} = \frac{y-1}{-7} = \frac{z-2}{5}$

Watch Video Solution

49. Two lines $L_1 x = 5, \frac{y}{3-\alpha} = \frac{z}{-2} and L_2 : x = \alpha \frac{y}{-1} = \frac{z}{2-\alpha}$ are coplanar. Then α can take value (s) a. 1 b. 2 c. 3 d. 4

Watch Video Solution

Watch Video Solution

50. If the projection of a line segment of the x,y and z-axes in 3-dimensional space are 2,3, and 6 respectively, then the length of the line segmetn is (A) 13 (B) 9 (C) 6 (D) 7

Watch Video Solution

51. If the lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar then k can have (A) exactly two values (B) exactly thre values (C) any value (D) exactly one value

Watch Video Solution

52. The point of intersection of the straighat line $\frac{x-2}{2}=\frac{y-1}{-3}=\frac{z+2}{1}$ with the plane $x+3y-z+1=0$ (A) (3,-1,1) (B) (-5,1,-1) (C) (2,0,3) (D) (4,-2,-1)

Watch Video Solution

53. If the lines $\frac{2x-1}{2}=\frac{3-y}{1}=(z-1)3$ and $\frac{xc+3}{2}=\frac{z+1}{p}=\frac{y+2}{5}$ are perpendicular to each other then p is equal to (A) 1 (B) -1 (C) 10 (D) $-\frac{7}{5}$

Watch Video Solution

54. The point $P(x, y, z)$ lies in the first octant and its distance from the origin is 12 units. If the positon vector of P makes 45^0 and60^0 with the x-axis and y-axis respectively, then the coordinastes of P are (A) $(3\sqrt{3}, 6, 3\sqrt{2})$ (B) $(4\sqrt{3}, 8, 4\sqrt{2})$ (C) $(6\sqrt{2}, 6, 6)$ (D) $(6, 6, 6\sqrt{2})$

Watch Video Solution

55. The distance between the plane $\vec{r}.\left(\hat{i}+2\hat{j}-2\hat{k}\right)+5=0$ and $\vec{r}.\left(2\hat{i}+4\hat{j}-4\hat{k}\right)-16=0$ is (A) 3

(B) $\frac{11}{3}$ (C) 13 (D) $\frac{13}{3}$

Watch Video Solution

56. If the straighat lines $\frac{x+1}{2}=\frac{-y+1}{3}=\frac{z+1}{-2}=\text{ and }\frac{x-3}{1}=\frac{y+\lambda}{2}=\frac{z}{3}$ intersect then the value of λ is (A) $-\frac{5}{8}$ (B) $-\frac{17}{8}$ (C) $-\frac{13}{8}$ (D) $-\frac{15}{8}$

Watch Video Solution

57. If the angle θ between the line $\frac{x+1}{1}=\frac{y-1}{2}=\frac{z-2}{2}$ and the plane $2x-y+\sqrt{pz}+4=0$ is such that $\sin\theta=\frac{1}{3}$, then the values of p is (A) 0 (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{5}{3}$

Watch Video Solution

58. The ratio in which the plne $y-1=0$ divides the straighat line joining (1,-1,3) and (-2,5,4)$is(A)$1:2(B)3:1(C)5:2(D)1:3`

Watch Video Solution

59. Equation of theine passing through hati+hatj-3hatk and $perpendic\underline{r} \rightarrow thepla \ne$ 2x-4y+3z+5=0is(A)(x-1)/2=(1-y)/(-4)=(z-3)/3(B)(x-1)/2=(1-y)/4=(z+3)/3(C)(x-2)/1=(y+4)/1)=(z-3)/3(D)(x-1)/(-2)=(1-y)/(-4)=(z-3)/3`

Watch Video Solution