MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

VECTOR AND 3D - JEE MAINS AND ADVANCED QUESTIONS

Exercise

1. Given two vectors are $\hat{i}-\hat{j}$ and $\hat{i}+2\hat{j}$. The unit vector coplanar with the two vectors nad perpendicular to first is (A) $\frac{1}{\sqrt{2}}\left(\hat{i}+\hat{j}\right)$ (B) $\frac{1}{\sqrt{5}}\left(2\hat{i}+\hat{j}\right)$ (C) $\pm\frac{1}{\sqrt{2}}\left(\hat{i}+\hat{j}\right)$ (D) none of these

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2. The vector $\hat{i}+x\hat{j}+3\hat{k}$ is rotated through an angle θ and doubled in magnitude, then it becomes $4\hat{i}+(4x-2)\hat{j}+2\hat{k}$. Then values of x are

(A) $-\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) 2

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3. If the vectors $\vec{a}, \vec{b}, \vec{c}$ form the sides BC,CA and AB respectively of a triangle ABC 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) $\vec{a}.\vec{b}=\vec{c}=\vec{c}=\vec{a}.a\neq 0$ (D) $\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}\vec{0}$

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4. I the vectors $\vec{a}, \vec{a}=x\hat{i}+y\hat{j}+z\hat{k}a$ and $\vec{b}=\hat{j}$ are such that $\vec{a}, \vec{c}$ and $\vec{b}$ form a righat handed system then $\vec{c}$ is (A) $z\vec{i}-x\vec{k}$ (B) $\vec{0}$ (C) $y\hat{j}$ (D) $-z\hat{i}+x\hat{k}$

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5. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^2 \end{vmatrix} = 0$ and vectors $(1, a, a^2)$, $(1, b, b^2)$ and $(1, c, c^2)$ are hon coplanar then the product abc equals (A) 2 (B) -1 (C) 1 (D) 0

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6. $\vec{a}, \vec{b}, \vec{c} are3 \overrightarrow{\longrightarrow} rs, sucht\hat{}$veca+vecb+vecc=0, |veca|=1,|vecb|=2,|vecc|=3, then veca.vecb+vecb.vecc+veca.veca` is equal to (A) 0 (B) -7 (C) 7 (D) 1

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7. If $\vec{u}, \vec{v}$ and $\vec{w}$ are three non coplanar vectors then $\left(\vec{u} + \vec{v} - \vec{w}\right).\left(\vec{u} - \vec{c}\right) \times \left(\vec{v} - \vec{w}\right)$ equals (A) $\vec{u}.\vec{v} \times \vec{w}$ (B) $\vec{u}.\vec{w} \times \vec{v}$ (C) $3\vec{u}.\vec{u} \times \vec{w}$ (D) 0

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8. Consider points A,B,C and D with position vectors $7\hat{i} - 4\hat{j} + 7\hat{k}$, $\hat{i} - 6\hat{j} + 10\hat{k}$, $\hat{i} - 3\hat{j} + 4\hat{k}$ and $5\hat{i} - \hat{j} + 5\hat{k}$ respectively. Then ABCD is a (A) square (B) rhombus (C) rectangle (D) parallelogram but not a rhombus

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9. The vector $\overrightarrow{AB} = 3\hat{i} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} - 2\hat{j} + 4\hat{k}$ are sides of a triangle ABC. The length of the median through A is (A) $\sqrt{18}$ (B) $\sqrt{72}$ (C) $\sqrt{33}$ (D) $\sqrt{288}$

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10. Let $\overrightarrow{u} = hai + \hat{j}$, $\overrightarrow{v} = \hat{i} - \hat{j}$ and $\overrightarrow{w} = \hat{i} + 2\hat{j} + 3\hat{k}$. If $\widehat{n}$ isa unit vector such that $\overrightarrow{u} . \widehat{n} = 0$ and $\overrightarrow{v} . \widehat{n} = 0$, $\left|\overrightarrow{w} . \widehat{n}\right|$ is equal to (A) 0 (B) 1 (C) 2 (D) 3

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11. If $\bar{a}, \bar{b}, \bar{c}$ are non coplanar vectros and λ is a real number then the vectors $\mp 2\bar{b} + 3\bar{c}, \lambda\bar{b} + 4\bar{c}$ and $(2\lambda - 1)\bar{c}$ are non coplanar for (A) all values of lamda (B) non value of lamda (C) all except two values of lamda (D) all except one vaue of lamda

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12. Let $\vec{u}, \vec{v}, \vec{w}$ be such that $|\vec{u}| = 1, |\vec{v}| = 2, |\vec{w}|3$. If the projection of $\vec{v}\,along\,\vec{u}$ is equal to that of $\vec{w}\,along\,\vec{v}, \vec{w}$ are perpendicular to each other then $|\vec{u} - \vec{v} + \vec{w}|$ equals (A) 2 (B) $\sqrt{7}$ (C) $\sqrt{14}$ (D) 14

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13. Let $\vec{a}, \vec{b},$ and $\vec{c}$ be three non zero vector such that no two of these are collinear. If the vector $\vec{a} + 2\vec{b}$ is collinear with $\vec{c}$ and $\vec{b} + 3\vec{c}\,iscol \in earwith$veca (lamda $be \in gsomenonzeroscalar)then$veca\+2vecb+6vecc$equals(A)$lamdaveca (B)lamdavecb(C)lamdavecc` (D) 0

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14. If C is the mid point of AB and P is any point outside AB then (A) $\overrightarrow{PA}+\overrightarrow{PB}+\overrightarrow{PC}=0$ (B) $\overrightarrow{PA}+\overrightarrow{PB}+2\overrightarrow{PC}=\overrightarrow{0}$ (C) $\overrightarrow{PA}+\overrightarrow{PB}=\overrightarrow{PC}$ (D) $\overrightarrow{PA}+\overrightarrow{PB}=2\overrightarrow{PC}$

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15. For any vector $\overrightarrow{a}$ the value of $\left(\overrightarrow{a}\times\hat{i}\right)^2+\left(\overrightarrow{a}\times\hat{j}\right)^2+\left(\overrightarrow{a}\times\hat{k}\right)^2$ is equal to (A) $4\overrightarrow{a}^2$ (B) $2\overrightarrow{a}^2$ (C) $\overrightarrow{a}^2$ (D) $3\overrightarrow{a}^2$

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16. Let $\overrightarrow{a}=\hat{i}-\hat{k},\ \overrightarrow{b}=x\hat{i}+\hat{j}+(1-x)\hat{k}$ and $\overrightarrow{c}=y\hat{i}+x\hat{j}+(1+x-y)\hat{k}$. T

[veca vecb vecc]` depends on (A) neither x nor y (B) both x and y (C) only x (D) only y

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17. The value of a for which the points A,B,C with position vectors $2\hat{i}-\hat{j}+\hat{k}, \hat{i}-3\hat{j}-5\hat{k}$ and $a\hat{i}-3\hat{j}+\hat{k}$ respectively are the vertices are the vetices of a righat angled triangle with $C=\frac{\pi}{2}$ are (A) -2 and -1 (B) -2 and 1 (C) 2 and -1 (D) `2 and 1

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18. Let $\vec{a}=\hat{i}+\hat{j}+\hat{k}, \vec{b}=\hat{i}-\hat{j}+2\hat{k}$ and $\vec{c}=x\hat{i}+(x-2)\hat{j}-\hat{k}$. If the vector $\vec{c}$ lies in the plane of $\vec{a}$ and $\vec{b}$ then x equals (A) 0 (B) 1 (C) -4 (D) -2

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19. The non zero vectors $\vec{a}, \vec{b}$, and $\vec{c}$ are related byi $\vec{a}=8\vec{b}nd\vec{c}=-7\vec{b}$. Then the angle between $\vec{a}$ and $\vec{c}$ is (A) π (B) 0 (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

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20. If $\overrightarrow{u}, \overrightarrow{v}, \overrightarrow{w}$ are noncoplanar vectors and p, q are real numbers, then the equality $\left[3\overrightarrow{u}, p\overrightarrow{v}, p\overrightarrow{w}\right] - \left[p\overrightarrow{v}, \overrightarrow{w}, q\overrightarrow{u}\right] - \left[2\overrightarrow{w}, q\overrightarrow{v}, q\overrightarrow{u}\right] = 0$ holds for (1) exactly one value of (p, q) (2) exactly two values of (p, q) (3) more than two but not all values of (p, q) (4) all values of (p, q)

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21. If the vectors $\overrightarrow{a} = \hat{i} - \hat{j} + 2\hat{k}, \overrightarrow{b} = 2\hat{i} + 4\hat{j} + \hat{k}$ and $\overrightarrow{c} = \lambda\hat{i} + \hat{j} + \mu\hat{k}$ are mutually orthogonal $then(\lambda, \mu) =$ (A) (-2,3) (B) (3,-2) (C) (-3,2) (D) (2,-3)

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

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23. If the vectors $p\hat{i}+\hat{j}+\hat{k},\ \hat{i}+q\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+r\hat{k}(p\neq q\neq r\neq 1)$ are coplanar then the value of $pqr-(p+q+r)$ is (A) 0 (B) -1 (C) -2 (D) 2

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24. Let $\widehat{a}$ and $\hat{b}$ be two unit vectors. If the vectors $\vec{c}=\widehat{a}+2\hat{b}$ and $\vec{d}=5\widehat{a}-4\hat{b}$ are perpendicular to each other then the angle between $\widehat{a}$ and $\hat{b}$ is (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

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25. Let ABCD be a parallelogram such that $\overrightarrow{AB} = \vec{q}, \overrightarrow{AD} = \vec{P}$ and $\angle BAD$ be an acute angle. If $\vec{r}$ is the vector that coincides with the altitude directed from the vertex B to the side AD, then $\vec{r}$ is given by-

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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) $\sqrt{18}$ (B) $\sqrt{72}$ (C) sqrt(33)(D)sqrt(45)`

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27. If $\left[\vec{a} \times \vec{b}\ \vec{b} \times \vec{c}\ \vec{c} \times \vec{a}\right] = \lambda\left[\vec{a}\ \vec{b}\ \vec{c}\right]^2 then\lambda$ is equal to (A) 1 (B) 2 (C) 3 (D) 0

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28. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be the non zero vectors such that $\left(\vec{a} \times \vec{b}\right) \times \vec{c} = \frac{1}{3}\left|\vec{b}\right|\left|\vec{c}\right|\vec{a}$. if theta is the acute angle between the vectors $\vec{b}$ and $\vec{a}$ then theta equals (A) $\frac{1}{3}$ (B) $\frac{\sqrt{2}}{3}$ (C) $\frac{2}{3}$ (D) $2\frac{\sqrt{2}}{3}$

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29. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \frac{\sqrt{3}}{2}\left(\vec{b} + \vec{c}\right)$. If $\vec{b}$ is not parallel to $\vec{c}$ then the angle between $\vec{a}$ and $\vec{b}$ is (A) $\frac{5\pi}{6}$ (B) $\frac{3\pi}{4}$ (C) $\frac{\pi}{2}$ (D) $\frac{2\pi}{3}$

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30. Let $\vec{a} = 2\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} + \hat{j}$. Let $\vec{c}$ be vector such that $\left|\vec{c} - \vec{a}\right| = 3, \left|\left(\vec{a} \times \vec{b}\right) \times \vec{c}\right| = 3$ and the angle between $\vec{c}$ and $\vec{a} \times \vec{b}$ be 30° Then , $\vec{a} . Ve$ is equal to

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31. Let $\vec{a}, \vec{b}$, and $\vec{c}$ be three non coplanar unit vectors such that the angle between every pair of them is $\frac{\pi}{3}$. If $\vec{a} \times \vec{b} + \vec{b} \times \vec{x} = p\vec{a} + q\vec{b} + r\vec{c}$ where p,q,r are scalars then the value of $\frac{p^2 + 2q^2 + r^2}{q^2}$ is

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32. If R^2 if the magnitude of the projection vector of the vecrtor $\alpha\hat{i} + \beta\hat{j} on \sqrt{3}\hat{i} + \hat{j} is \sqrt{3}$ and if $\alpha = 2 + \sqrt{3}\beta$ then possible value (s) of $|\alpha|$ is /are

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33. Let $\sqrt{3i} + \hat{j}, \hat{i} + \sqrt{3j}$ and $\beta\hat{i} + (1 - \beta)\hat{j}$ respectively be the position vedors of the points A, B and C with respect the origin O. If the distance of C from the bisector of the acute angle between OA and OB is $\frac{3}{\sqrt{2}}$, then the sum all possible values of β is ________.

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34. If the four points with position vectors $-2\hat{i}+\hat{k}, \hat{i}+\hat{j}+\hat{k}, \hat{j}-\hat{k}$ and $\lambda\hat{j}+\hat{k}$ are coplanar then $\lambda=$ (A) 1 (B) 2/3 (C) -1 (D) 0

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35. Let O be the origin and let PQR be an arbitrary triangle. The point S is such that $\overrightarrow{O}P\dot{\overrightarrow{O}}Q+\overrightarrow{O}R\dot{\overrightarrow{O}}S=\overrightarrow{O}R\dot{\overrightarrow{O}}P+\overrightarrow{O}Q\dot{\overrightarrow{O}}S=\overrightarrow{O}Q$. $\overrightarrow{O}R+\overrightarrow{O}P\dot{\overrightarrow{O}}S$ Then the triangle PQ has S as its: circumcentre (b) orthocentre (c) incentre (d) centroid

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36. A plane which passes through the point (3,2,0) nd the line $\frac{x-4}{1}=\frac{y-7}{5}=\frac{z-4}{4}$ is (A) $x-y+z=1$ (B) x+y+z=5(C)x+2y-z=1 (D)2x-y+z=5`

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37. A parallelepiped is formed by planes drawn through the points $(2, 3, 5) and (5, 9, 7)$, parallel to the coordinate planes. The length of a diagonal of the parallelepiped is 7 unit b. $\sqrt{38}$ unit c. $\sqrt{155}$ unit d. none of these

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38. The equation of the plane containing the line $\frac{x - x_1}{l} = \frac{y - y_1}{m} = \frac{z - z_1}{n}$ is $a(x - x_1) + b(y - y_1) + c(z - z_1) = 0,$ where $ax_1 + by_1 + cz_1 = 0$ b. $al + bm + cn = 0$ c. $\frac{a}{l} = \frac{b}{m} = \frac{c}{n}$ d. $lx_1 + my_1 + nz_1 = 0$

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39. The radius of the circle in which the sphere $x^{I2} + y^2 + z^2 + 2z - 2y - 4z - 19 = 0$ is cut by the plane

$x + 2y + 2z + 7 = 0$ is a. 2 b. 3 c. 4 d. 1

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40. 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 if (A) $k = 0 \text{ or } -1$ (B) $k = 1 \text{ or } -1$ (C) $k = 0 \text{ or } -3$ (D) $k = 3 \text{ or } -3$

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41. the two lines $x = ay + b, z = cy + d$ and $x = a'y + b, z = c'y + d'$ will be perpendicular, if and only if: (A) $aa' + ' = 1 = 0$ (B) $aa' + \prime + ' = 1 = 0$ (C) $aa' + \prime + ' = 0$ (D) $(a + a') + (b + b') + (c + c') = 0$

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42. The shortest distance from the plane $12x + y + 3z = 327$ to the sphere $x^2 + y^2 + z^2 + 4x - 2y - 6z = 155$ is a. 39 b. 26 c. $41 - \frac{4}{13}$ d. 13

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43. Two systems of rectangular axes have the same origin. If a plane cuts them at distance $a, b, c and d, b', c'$ from the origin, then a. $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} + \frac{1}{a'^2} + \frac{1}{b'^2} + \frac{1}{c'^2} = 0$ b. $\frac{1}{a^2} - \frac{1}{b^2} - \frac{1}{c^2} + \frac{1}{a'^2} - \frac{1}{b'^2} - \frac{1}{c'^2} = 0$ c. $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} - \frac{1}{a'^2} - \frac{1}{b'^2} - \frac{1}{c'^2} = 0$ d. $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} + \frac{1}{a'^2} + \frac{1}{b'^2} + \frac{1}{c'^2} = 0$

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44. A tetrahedron has vertices $O(0, 0, 0), A(1, 2, 1), B(2, 1, 3), and C(-1, 1, 2),$ then angle between face $OAB and ABC$ will be a. $\cos^{-1}\left(\frac{17}{31}\right)$ b. 30^0 c. 90^0 d. $\cos^{-1}\left(\frac{19}{35}\right)$

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45. Distance between two parallel planes $2x + y + 2z$ and $4x + 2y + 4z + 5 = 0$ (A) $\frac{3}{2}$ (B) $\frac{9}{2}$ (C) $\frac{7}{2}$ (D) $\frac{5}{2}$

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46. A line makes an angel θ with each of the x-and z-axes. If the angel β, which it makes with the y-axis, is such that $\sin^2\beta = 3\sin^2\theta, then \cos^2\theta$ equals a. $\frac{2}{3}$ b. $\frac{1}{5}$ c. $\frac{3}{5}$ d. $\frac{2}{5}$

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47. A line with direction cosines proportional to 2,1,2 meet each of the lines $x = y + a = zndx + a = 2y = 2z$. The coordinastes of each of the points of intersection are given by (A) $(3a, 2a, 3a), (a, a, 2a)$ (B)

$(3a, 2a, 3a), (a, a, a0$ (C) $(3a, 3a, 3a), (a, a, a)$ (D)

$92a, 3a, 3a), (2a, a, a0$

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48. If the straighat lines $x = 1 + s, y = -3 - \lambda s, z = 1 + \lambda s$ and $x = \frac{t}{2}, y = 1 + t, z = 2 - t$ with parameters s and t respectively, are coplanar, then λ equals (A) $-\frac{1}{2}$ (B) -1 (C) -2 (D) 0

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49. The intersection of the spheres $x^2 + y^2 + z^2 + 7x - 2y - z = 13 and x^2 + y^2 = z^2 - 3x + 3y + 4z = 8$ is the same as the intersection of one of the spheres and the plane a. $x - y - z = 1$ b. $x - 2y - z = 1$ c. $x - y - 2z = 1$ d. $2x - y - z = 1$

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50. If the plane $2ax - 3ay + 4az + 6 = 0$ passes through the midpoint of the line joining centres of the spheres $x^2 + y^2 + z^2 + 6x - 8y - 2z = 13$ and $x^2 + y^2 + z^2 - 10x + 4y - 2z =$

then a equals (A) `2 (B) -2 (C) 1 (D) -1

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51. The distance of the line $\vec{r} = 2\hat{i} - 2\hat{j} + 3\hat{k} + \lambda\left(\hat{i} - 2\hat{j} + 4\hat{k}\right)$ and the plane $\vec{r}.\left(\hat{i} + 5\hat{j} + \hat{k}\right) = 5$ is (A) $\frac{10}{3}$ (B) (1,-2) (C) $\frac{10}{3\sqrt{3}}$ (D) $\frac{10}{9}$

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

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53. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is (A) 0^0 (B) 90^0 (C) 45^0 (D) 30^0

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54. The plane $x + 2y - z = 4$ cuts the sphere $x^2 + y^2 + z^2 - x + z - 2 = 0$ in a circle of radius (A) $\sqrt{2}$ (B) 2 (C) 1 (D) 3

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55. the two lines $x = ay + b, z = cy + d$ and $x = a'y + b, z = c'y + d'$ will be perpendicular, if and only if: (A) $aa' + ' = 1 = 0$ (B) $aa' + ' + ' = 1 = 0$ (C) $aa' + ' + ' = 0$ (D) $(a + a') + (b + b') + (c + c') = 0$

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56. The image of the point $(-1, 3, 4)$ in the plane $-2y = 0$ is a. $\left(-\frac{17}{3}, -\frac{19}{3}, 4\right)$ b. $(15, 11, 4)$ c. $\left(-\frac{17}{3}, -\frac{19}{3}, 1\right)$ d. $\left(\frac{9}{5}, \frac{13}{5}, 4\right)$

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57. If a line makes an angle of $\frac{\pi}{4}$ with the positive directions of each of x-axis and y-axis, then the angle that the line makes with the positive direction of the z-axis is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

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58. If (2, 3, 5) is one end of a diameter of the sphere $x^2 + y^2 + z^2 - 6x - 12y - 2z + 20 = 0$, then the coordinates of the other end of the diameter are (1) $(4, 9, -3)$ (2) $(4, -3, 3)$ (3) $(4, 3, 5)$ (4) $(4, 3, -3)$

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59. Let L be the line of intersection of the planes $2x+3y+z=1 and x+3y+2z=2$. If L makes an angle α with the positive x-axis, then $\cos\alpha$ equals a. $\frac{1}{2}$ b. 1 c. $\frac{1}{\sqrt{2}}$ d. $\frac{1}{\sqrt{3}}$

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60. The line passing through the points (5, 1, a) and (3, b, 1) crosses the yzplane at the point $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$ .Then (1) $a=2, b=8$ (2) $a=4, b=6$ (3) $a=6, b=4$ (4) $a=8, b=2$

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61. If the straight lines $\frac{x-1}{k}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x-2}{3}=\frac{y-3}{k}=\frac{z-1}{2}$ intersect at a point, then the integer k is equal to (1) -5 (2) 5 (3) 2 (4) -2

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62. Let the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lie in the plane $x+3y-\alpha z+\beta=0$ then (α, β) equals (A) (6,-17) (B) (-6,7) (C) (5,-15) (D) (-5,15)

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63. The projections of a vector on the three coordinate axis are 6, 3 , 2 respectively. The direction cosines of the vector are (1) $6, -3, 2$ (2) $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$ (3) $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$ (4) $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$

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64. A line AB in three-dimensional space makes angles $45oand120o$ with the positive x-axis and the positive y-axis respectively. If AB makes an acute angle q with the positive z-axis, then q equals (1) $45o$ (2) $60o$ (3) $75o$ (4) $30o$

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65. Asertion: 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 he 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 te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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66. 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) $\frac{3}{2}$

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67. 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 the correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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68. The distance of the point $(1, -5, 9)$ from the plane $x - y + z = 5$ measured along a straighat line $x = y = z$ is (A) $5\sqrt{3}$ (B) $3\sqrt{10}$ (C) $3\sqrt{5}$ (D) $10\sqrt{3}$

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69. The length of the perpendicular drawn from the point $(3, -1, 11)$ to the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is (A) $\sqrt{33}$ (B) $\sqrt{53}$ (C) $\sqrt{66}$ (D) $\sqrt{29}$

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70. If the lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect then the value of k is (A) $\frac{2}{9}$ (B) $\frac{9}{2}$ (C) 0 (D) -1

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71. An equation of the plane through the point $(1, 0, 0)$ and $(0, 2, 0)$ and at a distance $\frac{6}{7}$ units from origin is (A) $x-2y+2z+1=0$ (B) $x-2y+2z-1=0(C)$x-2y+2z+5=0(D)None of above`

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72. Distance between two parallel planes $2x+y+2z=8$ and $4x+2y+4z+5=0$ is (A) $\frac{7}{2}$ (B) $\frac{5}{2}$ (C) $\frac{3}{2}$ (D) $\frac{9}{2}$

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73. If the lines $\frac{x-2}{1}=\frac{y-3}{1}\Bigg)\frac{z-4}{-k}$ 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

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74. The image of the line $\frac{x-1}{3}=\frac{y-3}{1}=\frac{z-4}{-5}$ in the plane $2x-y+z+3=0$ is the line (1) $\frac{x+3}{3}=\frac{y-5}{1}=\frac{z-2}{-5}$ (2) $\frac{x+3}{-3}=\frac{y-5}{-1}=\frac{z+2}{5}$ (3) $\frac{x-3}{3}=\frac{y+5}{1}=\frac{z-2}{-5}$ (3) $\frac{x-3}{-3}=\frac{y+5}{-1}=\frac{z-2}{5}$

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75. The angle between the lines whose direction cosines satisfy the equations $l+m+n=0$ and $l^2=m^2+n^2$ is (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

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76. The distance of the point (1, 0, 2) from the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane x y + z = 16, is : (1) $2\sqrt{14}$ (2) 8 (3) $3\sqrt{21}$ (4) 27

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77. The equation of the plane containing the line $2x - 5y + z = 3; x + y + 4z = 5$, and parallel to the plane, $x + 3y + 6z = 1$, is : (1) $2x + 6y + 12z = 13$ (2) $x + 3y + 6z = -7$ (3) $x + 3y + 6z = 7$ (4) $2x + 6y + 12z = -13$

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78. If the line, $\frac{x-3}{2} = \frac{y+2}{-1} = \frac{z+4}{3}$ lies in the place, $lx + my - z = 9$, then $l^2 + m^2$ is equal to: (1) 26 (2) 18 (3) 5 (4) 2

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79. The distance of the point $(1, -5, 9)$ from the plane $x - y + z = 5$ measured along the line $x = y = z$ is : (1) $3\sqrt{10}$ (2) $10\sqrt{3}$ (3) $\frac{10}{\sqrt{3}}$ (4) $\frac{20}{3}$

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80. If the image of the point $P(1, -2, 3)$ in the plane, $2x + 3y - 4z + 22 = 0$ measured parallel to the line, $\frac{x}{1} - \frac{y}{4} - \frac{z}{5}$ is Q , then PQ is equal to : $\sqrt{42}$ (2) $6\sqrt{5}$ (3) $3\sqrt{5}$ (4) $3\sqrt{42}$

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81. The distance of the point $(1, 3, -7)$ from the plane passing through the point $(1, -1, -1)$, having normal perpendicular to both the lines $\frac{x-1}{1} = \frac{y+2}{-2} = \frac{z-4}{3} and \frac{x-2}{2} = \frac{y+1}{-1} = \frac{z+7}{-1} is:$ $\frac{5}{\sqrt{83}}$ (2) $\frac{10}{\sqrt{74}}$ (3) $\frac{20}{\sqrt{74}}$ (4) $\frac{10}{\sqrt{83}}$

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82. From a point $P(\lambda, \lambda, \lambda)$, perpendicular PQ and PR are drawn respectively on the lines $y = x, z = 1$ and $y = -x, z = -1$.If P is such that $\angle QPR$ is a right angle, then the possible value(s) of λ is/(are)

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83. In R', consider the planes $P_1, y = 0$ and $P_2 : x + z = 1$. Let P_3, be a plane, different from P_1, and P_2, which passes through the intersection of P_1, and P_2. If the distance of the point $(0, 1, 0)$ from P_3, is 1 and the distance of a point (α, β, γ) from P_3 is 2, then which of the following relation is (are) true ?

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84. The value of λ or which the straighat line $\frac{x-\lambda}{3} = \frac{y-1}{2+\lambda} = \frac{z-3}{-1}$ may lie on the plane $x - 2y = 0$ (A) 2 (B) 0 (C) $-\frac{1}{2}$ (D) there is no such λ

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85. the mirror image of point $(3, 1, 7)$ with respect to the plane $x - y + z = 3$ is P. then equation plane which is passes through the point P and contains the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{1}$.

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