MATHS

BOOKS - CBSE COMPLEMENTARY MATERIAL MATHS (HINGLISH)

THREE DIMENSIONAL GEOMETRY

One Mark Questions

1. The distance of the point P(a,b,c)` from the x-axis is

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2. The angle between the lines 2x=3y=-z and 6x=-y=-4z is

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3. Write the equation of a line passsing through (2,-3,5) and parallel to line $\frac{x-1}{3}=\frac{y-2}{4}=\frac{z+1}{-1}$

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4. Write the equation of a line through (1,2,3) and parallel to $\vec{r}.\left(\hat{i}-\hat{j}+3\hat{k}\right)=5$

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5. What is the value of λ for which the lines $\frac{x-1}{2}=\frac{y-3}{5}=\frac{z-1}{\lambda}$ and $\frac{x-2}{3}=\frac{y+1}{-2}=\frac{z}{2}$ are prependicular to each other

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6. Write line $\vec{r}=\left(\hat{i}-\hat{j}\right)+\lambda\left(2\hat{j}-\hat{k}\right)$ in to cartesian form

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7. If the direction ratio of a line is $1, -2, 2$ Then what are the direction cosines of the line

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8. Find the angle between the planes $2x - 3y + 6z = 9$ and xy plane

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9. Equations of the passing through the point $(0, 1, 2)$ and equally inclined to the co - ordinates axes are ,

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10. What is the perpendicular distance of plane 2x-y+3z =10 from origin

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11. What is the y intercept of the plane x-5y+7z=10

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12. The distance between the planes $x + 2y - 2z + 1 = 0$ and $2x + 4y - 4z + 5 = 0$, is

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13. The equation of a plane which cuts equal intercepts of unit length on the axes is

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14. Are the planes x+y-2z+4=0 and 3x+3y-6z+5=0 intersecting

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15. Find the equation of the plane through the point (1,4,-2) and parallel to the plane $-2x + y - 3z = 7$.

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16. The vector equation of he plane which is at a distance of 8 units from the origin which is normal to the vector $2\hat{i} + \hat{j} + 2\hat{k}$ is

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17. What is equation of the plane if the foot of perpendicular from origin to this plane is (2,3,4) ?

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18. Find the angles between the planes $\vec{r}\left(\hat{i} - 2\hat{j} - 2\hat{k}\right) = 1$ and $\vec{r}\left(3\hat{i} - 6\hat{j} + 2\hat{k}\right) = 0$

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19. If O is the origin, $OP = 3$ with direction ratios proportional to -1, 2, -2 then the coordinates of P are-

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

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21. Write the line 2x=3y =4z in vector form

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22. The line $\frac{x-4}{1}=\frac{2y-4}{2}=\frac{k-z}{-2}$ lies exaclty in the plane 2x-4y+z=7 find the value of k

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Two Mark Questions

1. What is the anlge between the line $\frac{x+1}{2}=\frac{2y-1}{4}=\frac{2-z}{4}$ and the plane 2x+y-2z+4=0

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2. Find the equation of a line passing though (2,0,5) and which is parallel line 6x-2=3y+1=2z-2

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3. Find the equation of the plane passes through the point $(2, 3, -4)$ and $(1, -1, 3)$ and parallel to x-axis.

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4. Find the distane between the planes 2x+3y-4z+5=0 and $\vec{r}\left(4\hat{i}+\hat{6}j-8\hat{k}\right)=11$

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5. The equation of a line are 5x-3 =15y+7=3-10z write the direction cosines of the line

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6. If a line makes angle α, β and γ with the axes respectively then $\sin^2\alpha+\sin^2\beta+\sin^2\gamma=$

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7. Find the equation of a line passing through the point (2,0,1) and parallel to the line whose equation is $\vec{r} = (2\lambda + 3)\hat{i} + (7\lambda - 1)\hat{j} + (-3\lambda + 2)\hat{k}$

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8. The plane $2x - 3y + 6z - 11 = 0$ makes an angle $\sin^{-1}(\alpha)$ with X-axis. The value of $alpah$ is

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9. If $4x + 4y - cz = 0$ is the equation of the plane passing through the origin that contains the line $\frac{x+5}{2} = \frac{y}{3} = \frac{z-7}{4}$ then find the value of c

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10. Find the equation of the plane passing through the point (-2,1,-3) and making equal intercept on the coordinate axes

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11. Write the sum of intercepts cut off by the plane $\vec{r}\left(2\hat{i}+\hat{j}-\hat{k}\right)-5=0$ on the three axis

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Four Mark Questions

1. Find the equation of a plane containing the point (0,-1,-1),(-4,4,4)and (4,5,1) alos show that (3,9,4) lies on the that plane

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2. Find the equation of the plane which is perpendicualr to the plane $\vec{r}\left(5\hat{i}+2\hat{j}+6\hat{k}\right)+8=0$ and which is containg the line of intersection of the planes $\vec{r}\left(\hat{i}+2\hat{j}+3\hat{k}\right)=4$ and $\vec{r}\left(2\hat{i}+\hat{j}-\hat{k}\right)+5=0$

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3. Find the distance of the point $(3,4,5)$ from the plane $x+y+z=2$ measured parallel to the line $2x=y=z$

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4. Find the equation of the plane passing through the lineof intersection of the planes $x+2y+3z-5=0$ and $3x-2y-z+1=0$ and cutting off equal intercepts on the x-axis and z-axis.

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5. Find the vector equation of the line passing through the point with position vector $2\hat{i} - \hat{j} + \hat{k}$ and parallel to the line joining the points with position vectors $-\hat{i} + 4\hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 2\hat{k}$. Also, find the cartesian equation of the line.

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6. Find the equation of the plane through the points A(3,4,2) and B(7,0,6) and perpendicular to the plane $2x - 5y = 15$.

Hint: The given plane is $2x - 5y + 0z = 15$.

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7. The equation of the plane through the intersection of the planes $\vec{r}.\left(2\hat{i} + 6\hat{j}\right) + 12 = 0$ and $\vec{r}.\left(3\hat{i} - \hat{j} + 4\hat{k}\right) = 0$ and at a unit distance from the origin, is

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8. Find the image of point (3,-2,1) in the plane 3x- y + 4z = 2.

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9. Find image (reflection)of the point (7,4,-3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$

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10. find the equation of a plane passing through the points $(2, -1, 0)$ and $(3, -4, 5)$ and parallel to the line $2x = 3y = 4z$

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11. Find the distance of the point $(-1, -5, -10)$ from the point of intersection of line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{2}$ and the plane x-y+z=5 measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$

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12. Find the equation of the plane passing through the points $(2, -1, 0)$ and $(3, -4, 5)$ and parallel to the line 2x=3y=4z.

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13. Show that the lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ intersect. Also find their point of intersection.

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14. Find the shortest distacne between the lines

$\vec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \mu\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$ and

$\vec{r} = \left(2\hat{i} + 4\hat{j} + 5\hat{k}\right) + \lambda\left(3\hat{i} + 4\hat{j} + 5\hat{k}\right)$

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15. Find the distacne of the point (2,3,-4) from the line $\frac{x+2}{3}=\frac{2y+3}{4}=\frac{3z+4}{5}$ measured paralle to the plane 4x+12y-3z+1=0

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16. Find the equation of plane passing through the point (-1,-1,2) and perpendicular to each of the plane $\vec{r}\left(2\hat{j}-3\hat{k}\right)=2$ and $\vec{r}.\left(5\hat{i}-4\hat{j}+\hat{k}\right)=6$

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17. Find the equation of a plane passing through (-1,3,2) and parallel to each of the line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and $\frac{x+2}{3}=\frac{y+1}{2}=\frac{z+1}{5}$

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18. Show that the plane $\vec{r}.\left(\hat{i}-3\hat{j}+5\hat{k}\right)=7$ contains the line $\vec{r}=\left(\hat{i}+3\hat{j}+3\hat{k}\right)+\lambda\left(3\hat{i}+\hat{j}\right)$

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19. Check the co planarity of lines

$\vec{r}=\left(-3\hat{i}+\hat{j}+5\hat{k}\right)+\lambda\left(-3\hat{i}+\hat{j}+5\hat{k}\right).\vec{r}=\left(-\hat{i}+2\hat{j}+5\hat{k}\right)+\mu$

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Six Mark Questions

1. Find the shortest distance between the lines $\frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1}$ and $\frac{x-3}{1}=\frac{y-5}{-2}=\frac{z-7}{1}$

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2. Find the shortest distance between the lines

$\vec{r} = (1-\lambda)\hat{i} + (\lambda-2)\hat{j} + (3-2\lambda)\hat{k}$, $\vec{r} = (\mu+1) + (2\mu-1)\hat{j} - (2\mu$

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3. A variable plane is at a constant distance 3p from the origin and meets the coordinates axes in A,B and C if the centroid of $\triangle ABC$ is (α, β, γ) then show that $\alpha^{-2} + \beta^{-2} + \gamma^{-2} = p^{-2}$

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4. A vector $\vec{n}$ f magnitude 8 units is inclined to x-axis at 45^0 , y-axis at 60^0 and an acute angle with z-axis. If a plane passes through a point $\left(\sqrt{2}, -1, 1\right)$ and is normal to $\vec{n}$, find its equation in vector form.

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5. Find the foot of the perpendicular from the point $2\hat{i} - \hat{j} + 5\hat{k}$ on the line $\vec{r} = \left(11\hat{i} - 2\hat{j} - 8\hat{k}\right) + \lambda\left(10\hat{i} - 4\hat{j} - 11\hat{k}\right)$ also find the length of the perpendicular

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6. A line makes angles $\alpha, \beta, \gamma$and $\delta$with the diagonals of a cube, prove that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = \frac{4}{3}$

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7. Find the equation of the plane passing through the intersection of the planes $2x + 3y - z + 1 = 0 and x + y - 2z + 3 = 0$ and perpendicular to the plane $3x - y - 2z - 4 = 0$.

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8. Find the coordinates of the centroid of the triangle whose vertices are (3,5); (4,6) and (2,4).

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9. Show that the lines

$$\frac{x-1}{2}=\frac{y+1}{3}=z \text{ and } \frac{x+1}{5}=\frac{y-2}{1}z=2$$

do not intersect each other .

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