# CLASS XII – MATHEMATICS – CHAPTER 11
# VECTOR & 3 DIMENSIONAL GEOMETRY

Name: Date:

**Q01**. Find the directions cosines of x, y and z axis.

**Q02**. Find the vector equation for the line passing through the points (–1, 0, 2) and (3, 4, 6).

**Q03**. Find the angle between the vector having direction ratios 3, 4, 5 and 4, –3, 5.

**Q04**. What is the direction ratios of the line segment joining $P(x_1\ y_1\ z_1)$ and $Q\ (x_2\ y_2\ z_2)$.

**Q05**. The Cartesian equation of a line is $\frac{x+3}{2} = \frac{y-5}{4} = \frac{z+6}{2}$. Find the vector equation for the line.

**Q06**. Show that the lines $\frac{x+3}{-3} = \frac{y-1}{1} = \frac{z-5}{5}$ and $\frac{x+1}{-1} = \frac{y-2}{2} = \frac{z-5}{5}$ are coplanar.

**Q07**. If a line has the direction ratios –18, 12, –4 then what are its direction cosines.

**Q08**. Find the angle between the pair of line given by

$\vec{r} = (3\hat{i} + 2\hat{j} - 4\hat{k}) + \lambda(\hat{i} - 2\hat{j} + 2\hat{k})$; $\vec{r} = 5\hat{i} - 2\hat{j} + \mu(3\hat{i} + 2\hat{j} + 6\hat{k})$

**Q09**. Prove that the points A (2, 1, 3) B (5, 0, 5) and C (–4, 3,–1) are collinear

**Q10**. Find the direction cosines of the line passing through the two points (2, 4,–5) and (1,2,3).

**Q11**. Find the equation of the plane with intercepts 2, 3 and 4 on the x, y and z axis respectively.

**Q12**. If the equations of a line AB is $\frac{x-3}{1} = \frac{y+2}{-2} = \frac{z-5}{4}$ find the directions ratio of line parallel to AB.

**Q13**. If the line has direction ratios 2,–1,–2 determine its direction Cosines.

**Q14**. The Cartesian equation of a line is $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$. Write its vector form.

**Q15**. Cartesian equation of a line AB is $\frac{2x-1}{2} = \frac{4-y}{7} = \frac{z+1}{2}$ write the direction ratios of a line parallel to AB.

**Q16**. Find the vector and Cartesian equation of the line through the point (5, 2,–4) and which is parallel to the vector $3\hat{i} + 2\hat{j} - 8\hat{k}$

**Q17**. Find the angle between the lines: $\vec{r} = (3\hat{i} + \hat{j} - 2\hat{k}) + \lambda(\hat{i} - \hat{j} - 2\hat{k})$; $\vec{r} = (2\hat{i} - \hat{j} - 56\hat{k}) + \mu(3\hat{i} - 5\hat{j} - 4\hat{k})$

**Q18**. Find the shortest distance between the lines:

$\vec{r} = (\hat{i} + 2\hat{j} + \hat{k}) + \lambda(\hat{i} - \hat{j} + \hat{k})$; $\vec{r} = (2\hat{i} - \hat{j} - \hat{k}) + \mu(2\hat{i} + 5\hat{j} + 2\hat{k})$

**Q19**. Find the direction cosines of the unit vector $\perp$ to the plane $\vec{r}.(6\hat{i} - 3\hat{j} - 2\hat{k}) + 1 = 0$ passing through the origin.

**Q20**. Find the shortest between the $l_1$ and $l_2$ whose vectors equations are

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

**Q21**. Find the angel between lines: $\vec{r} = (2\hat{i} - 5\hat{j} + \hat{k}) + \lambda(3\hat{i} + 2\hat{j} + 6\hat{k})$; $\vec{r} = (7\hat{i} - 6\hat{k}) + \mu(\hat{i} + 2\hat{j} + 2\hat{k})$

**Q22**. Show that the lines $\frac{x-5}{7} = \frac{y+2}{-5} = \frac{z}{1}$ and $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ Are perpendicular to each other.

**Q23**. Find the vector equations of the plane passing through the points R (2,5,–3), Q (–2,–3,5) and T (5,3,–3).

**Q24**. Find the distance between the lines $L_1$ and $L_2$ given by

$\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} + 3\hat{j} + 6\hat{k})$; $\vec{r} = 3\hat{i} + 3\hat{j} - 5\hat{k} + \mu(2\hat{i} + 3\hat{j} + 6\hat{k})$.

**Q25**. Find the angle between lines $\frac{x}{2} = \frac{y}{2} = \frac{z}{1}$; $\frac{x-5}{4} = \frac{y-5}{1} = \frac{z-3}{8}$.

**Q26**. Find the shortest distance between the lines $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$ and $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$.

**Q27**. Find the vector and Cartesian equations of the plane which passes through the point (5,2,–4) and perpendicular to the line with direction ratios (2,3,–1)

**Q28**. Find the Cartesian equation of the plane: $\vec{r}[(5-2t)\hat{i} + (3-t)\hat{j} + (25+t)\hat{k}] = 15$.

**Q29**. Find the distance of a point (2,5,–3) from the plane $\vec{r}.(6\hat{i} - 3\hat{j} + 2\hat{k}) = 4$

**Q30**. Find the angle between the line $\frac{x-2}{2} = \frac{y-1}{5} = \frac{z+3}{-3}$ and $\frac{x+2}{-1} = \frac{y-4}{8} = \frac{z-5}{4}$.

**Q31**. Find the shortest distance: $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} - 3\hat{j} + 2\hat{k})$ and; $\vec{r} = (4\hat{i} + 5\hat{j} + 6\hat{k}) + \mu(2\hat{i} + 3\hat{j} + \hat{k})$

**Q32**. Find the Cartesian equation of plane: $\vec{r}.(\hat{i} + \hat{j} - \hat{k}) = 2$.

**Q33**. Find the angle between the line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane $10x + 2y - 11z = 3$.

**Q34**. Find the value of P so that the lines $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2}$ and $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles.

**Q35**. Find the shortest distance between the lines whose vector equation are

$\vec{r} = (1-t)\hat{i} + (t-2)\hat{j} + (3-2t)\hat{k}$ and $\vec{r} = (s+1)\hat{i} + (2s-1)\hat{j} - (2s+1)\hat{k}$

**Q36**. Find the angle between the two planes $2x + y - 2z = 5$ and $3x - 6y - 2z = 7$using vector method.

**Q37**. Find the equation of the point where the line through the points A(3, 4, 1) and B(5, 1, 6) crosses the XY plane.

**Q38**. Prove that if a plane has the intercepts a, b, c is at a distance of p units from the origin then

$\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{p^2}$