

JEE Main 2026 Coordinate and 3D Geometry Problems with Solutions

Q1. Find the equation of a circle with center (2, 3) passing through (5, 7).

Solution

$$\text{Radius } r = \sqrt{(5 - 2)^2 + (7 - 3)^2} = 5$$
$$(x - 2)^2 + (y - 3)^2 = 25$$

Answer: $(x - 2)^2 + (y - 3)^2 = 25$

Q2. Find the equation of the tangent to $x^2 + y^2 = 25$ at (3, 4).

Solution

$$\text{Equation: } 3x + 4y = 25$$
$$\Rightarrow 3x + 4y - 25 = 0$$

Answer: $3x + 4y - 25 = 0$

Q3. Find the equation of the parabola with vertex at the origin and focus (0, 3).

Solution

$$\text{Equation: } x^2 = 4ay \Rightarrow a = 3$$

Answer: $x^2 = 12y$

Q4. Find the equation of an ellipse with foci $(\pm 4, 0)$, major axis length 10.

Solution

$$2a = 10 \Rightarrow a = 5, c = 4 \Rightarrow b^2 = a^2 - c^2 = 9$$

Answer: $x^2/25 + y^2/9 = 1$

Q5. Equation of hyperbola with transverse axis along x-axis, vertices $(\pm 3, 0)$ and foci $(\pm 5, 0)$.

Solution

$$a = 3, c = 5 \Rightarrow b^2 = c^2 - a^2 = 16 \\ \Rightarrow x^2/9 - y^2/16 = 1$$

Answer: $x^2/9 - y^2/16 = 1$

Q6. Find the points of intersection of $x^2 + y^2 = 25$ and $y = 4x - 3$.

Solution

Substitute: $x^2 + (4x-3)^2 = 25 \Rightarrow 17x^2 - 24x - 16 = 0 \Rightarrow x = 2, -8/17$

So, $y = 5$ and $y = -59/17$
 $(2, 5), (-8/17, -59/17)$

Answer: $(2, 5), (-8/17, -59/17)$

Q7. Find area of triangle with vertices $(2, 3), (4, 5), (6, 7)$.

Solution

All three points are collinear (slope = 1), area = 0.

Answer: 0

Q8. Find center and radius of $x^2 + y^2 - 4x + 6y - 12 = 0$.

Solution

$$(x-2)^2 + (y+3)^2 = 25$$

Center $(2, -3)$, radius 5.

Answer: Center (2, -3), radius 5.

Q9. Find the condition that line $y = mx + c$ may touch circle $x^2 + y^2 = a^2$

Solution

Perpendicular distance from center (0,0) to line = radius:

$$|c| / \sqrt{1+m^2} = a \Rightarrow c^2 = a^2(1+m^2)$$

Answer: $c^2 = a^2(1+m^2)$

Q10. Find slope of tangent to $y^2 = 8x$ at point (2, 4).

Solution

$$\text{Differentiate: } 2y \, dy/dx = 8 \Rightarrow dy/dx = 4/y = 1$$

$$\text{Slope} = 1$$

Answer: Slope = 1

Q11. Find equation of plane passing through (1, 0, 0), (0, 2, 0), (0, 0, 3).

Solution

$$x/1 + y/2 + z/3 = 1 \Rightarrow 6x + 3y + 2z = 6$$

Answer: $6x + 3y + 2z = 6$

Q12. Find equation of plane passing through (1, 2, 3) and normal to vector $2\hat{i} + 3\hat{j} - \hat{k}$.

Solution

$$2(x-1) + 3(y-2) - (z-3) = 0 \Rightarrow 2x + 3y - z = 7$$

Answer: $2x + 3y - z = 7$

Q13. Find distance between planes $2x - 2y + z = 3$ and $2x - 2y + z = -7$.

Solution

$$\text{Distance} = |3 - (-7)| / \sqrt{4 + 4 + 1} = 10 / 3$$

Answer: $10 / 3$

Q14. Find symmetric form of line passing through $(1, 2, 3)$ and parallel to vector $2\hat{i} - 3\hat{j} + \hat{k}$.

Solution

$$x - 1/2 = y - 2/-3 = z - 3/1$$

Answer: $x - 1/2 = y - 2/-3 = z - 3/1$

Q15. Find direction cosines of a line equally inclined to all coordinate axes.

Solution

$$\text{If } l = m = n \text{ and } l^2 + m^2 + n^2 = 1 \Rightarrow 3l^2 = 1 \Rightarrow l = 1/\sqrt{3}$$

$$l = m = n = 1/\sqrt{3}$$

Answer: $l = m = n = 1/\sqrt{3}$