1. Length of the median from B on AC where A (– 1, 3), B (1, – 1), C (5, 1) is

(a) $\sqrt{18}$ (b*) $\sqrt{10}$ (c) $2\sqrt{3}$ (d) 4

2. The points (0, – 1), (– 2, 3), (6, 7) and (8, 3) are

(a) collinear

(b) vertices of a parallelogram which is not a rectangle

(c*) vertices of a rectangle, which is not a square

(d) none of these

3. If O be the origin and if $P_1 (x_1, y_1)$ and $P_2 (x_2, y_2)$ be two points, then $OP_1 . OP_2 \cos (\angle P_1OP_2)$ is equal to

(a) $x_1 y_2 + x_2 y_1$ (b) $(x_1^2 + y_1^2)(x_2^2 + y_2^2)$

(c) $(x_1 – x_2)^2 + (y_1 – y_2)^2$ (d*) $x_1 x_2 + y_1 y_2$

4. The coordinates of the middle points of the sides of a triangle are (4, 2) (3, 3) and (2, 2), then the coordinates of its centroid are

(a*) (3, 7/3) (b) (3, 3) (c) (4, 3) (d) none of these

5. The incentre of the triangle whose vertices are (– 36, 7), (20, 7) and (0, – 8) is

(a) (0, – 1) (b*) (– 1, 0) (c) (1/2, 1) (d) none of these

6. The triangle with vertices at (2, 4), (2, 6) and $(2 + \sqrt{3}, 5)$ is

(a*) right angled (b) right angled and isosceles

(c) equilateral (d) obtuse angled

7. The area of the triangle with vertices at the point (a, b + c), (b, c + a), (c, a + b) is

(a*) 0 (b) a + b + c (c) ab + bc + ca (d) none of these

8. The locus of the mid–point of the portion intercepted between the axes by the line $x \cos \alpha + y \sin \alpha = p$, where p is a constant is

(a) $x^2 + y^2 = 4p^2$ (b*) $\frac{1}{x^2} + \frac{1}{y^2} + \frac{4}{p^2}$ (c) $x^2 + y^2 = \frac{4}{p^2}$ (d) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{p^2}$

9. If A $(\cos \alpha, \sin \alpha)$, B $(\sin \alpha, – \cos \alpha)$, C (1, 2) are the vertices of a Δ ABC, then as α varies the locus of its centroid is

(a) $x^2 + y^2 – 2x – 4y + 1 = 0$ (b*) $3(x^2 + y^2) – 2x – 4y + 1 = 0$

(c) $x^2 + y^2 – 2x – 4y + 3 = 0$ (d) none of these

10. If A and B are two fixed points, then the locus of a point which moves in such a way that the angle APB is a right angle is

(a*) a circle (b) an ellipse (c) a parabola (d) none of these

11. The nearest point on the line $3x – 4y = 25$ from the origin is

(a) (– 4, 5) (b*) (3, – 4) (c) (3, 4) (d) (3, 5)

12. The image of the point (– 1, 3) by the line $x – y = 0$ is

(a*) (3, – 1) (b) (1, – 3) (c) (– 1, – 1) (d) (3, 3)

13. If three vertices of a rhombus taken in order are (2, – 1), (3, 4) and (– 2, 3), then the fourth vertex is
(a*) (– 3, – 2) (b) (3, 2) (c) (2, 3) (d) (1, 2)

14. If (– 4, 0) and (1, – 1) are two vertices of a triangle of area 4 square units, then its third vertex lies on
(a) $y = x$ (b) $5x + y + 12 = 0$ (c*) $x + 5y – 4 = 0$ (d) none of these

15. If the sum of the distances of a point from two perpendicular lines in a plane is 1, then its locus is
(a*) a square (b) a circle (c) a straight line (d) two intersecting lines

16. Three lines $px + qy + r = 0$, $qx + ry + p = 0$ and $rx + py + q = 0$ are concurrent if
(a*) $p + q + r = 0$ (b*) $p^2 + q^2 + r^2 = pq + qr + rp$
(c*) $p^3 + q^3 + r^3 = 3\,pqr$ (d) none of these

17. The medians AD and Be of the triangle with vertices A (0, b), B (0, 0) and C (a, 0) are mutually perpendicular if
(a) $b = \sqrt{2}\,a$ (b*) $a = \sqrt{2}\,b$ (c) $b = -\sqrt{2}\,a$ (d*) $a = -\sqrt{2}\,b$

18. The equation of a line which passes through $(a\cos^3\theta, a\sin^3\theta)$ and perpendicular to the line $x\sec\theta + y\,\mathrm{cosec}\,\theta = a$ is
(a) $x\cos\theta + y\sin\theta = 2a\cos 2\theta$ (b) $x\sin\theta – y\cos\theta = 2a\sin 2\theta$
(c) $x\sin\theta + y\cos\theta = 2a\cos 2\theta$ (d*) none of these

19. The ends of the base of an isosceles triangle are at (2a, 0) and (0, a). The equation of one side is $x = 2a$. The equation of the other side is
(a) $x + 2y – a = 0$ (b) $x + 2y = 2a$
(c) $3x + 4y – 4a = 0$ (d*) $3x – 4y + 4a = 0$

20. The set of lines $ax + by + c = 0$, where $3a + 2b + 4c = 0$ is concurrent at the point
(a*) $\left(\frac{3}{4}, \frac{1}{2}\right)$ (b) $\left(\frac{1}{2}, \frac{3}{4}\right)$ (c) $\left(-\frac{3}{4}, -\frac{1}{2}\right)$ (d) none of these

21. If the lines $x + ay + a = 0$, $bx + y + b = 0$ and $cx + cy + 1 = 0$ (a, b, c being distinct $\neq 1$) are concurrent, then the value of $\frac{a}{a-1} + \frac{b}{b-1} + \frac{c}{c-1}$ is
(a) – 1 (b) 0 (c*) 1 (d) none of these

22. All points lying inside the triangle formed by the points (1, 3), (5, 0) and (– 1, 2) satisfy
(a*) $3x + 2y \geq 0$ (b) $2x + y – 13 \geq 0$
(c*) $2x – 3y – 12 \leq 0$ (d) $– 2x + y \geq 0$

23. The distance of the point (3, 5) from the line $2x + 3y – 14 = 0$ measured parallel to the line $x – 2y = 1$ is
(a) $7 / \sqrt{5}$ (b) $7 / \sqrt{13}$ (c*) $\sqrt{5}$ (d) $\sqrt{13}$

24. If a, b, c are in AP, then $ax + by + c = 0$ will always pass through a fixed point whose coordinates are
(a*) (1, – 2) (b) (– 1, 2) (c) (1, 2) (d) (– 1, – 2)

25. P (2, 1), Q (4, – 1), R (3, 2) are the vertices of a triangle and if through P and R lines parallel to opposite sides are drawn to intersect in S, then the area of PQRS is
(a) 6 (b*) 4 (c) 8 (d) 12

26. Points on the line $x + y = 4$ that lie at a unit distance from the line $4x + 3y – 10 = 0$ are
(a*) (3, 1) and (– 7, 11) (b) (– 3, 7) and (2, 2)
(c) (– 3, 7) and (– 7, 11) (d) none of these

27. The equation of the line passing through the intersection of the lines $x – 3y + 1 = 0$ and $2x + 5y – 9 = 0$ and at distance $\sqrt{5}$ from the origin is
(a) $2x – y = 5$ (b) $x + 2y = 5$ (c*) $2x + y = 5$ (d) $x + 2y = 1$

28. The line $x + y = 4$ divides the line joining $(-1, 1)$ and $(5, 7)$ in the ratio $\lambda : 1$, then the value of λ is
(a) 2 (b*) 1/2 (c) 3 (d) none of these

29. The image of the point (1, 3) in the line $x + y - 6 = 0$ is
(a*) (3, 5) (b) (5, 3) (c) (1, – 3) (d) (– 1, 3)

30. The equation of the line passing through the intersection of $x - \sqrt{3}y + \sqrt{3} - 1 = 0$ and $x + y - 2 = 0$ and making an angle of 15^o with first line is
(a*) $x - y = 0$ (b) $x - y + 1 = 0$ (c) $y = 1$ (d) $\sqrt{3}x - y + 1 - \sqrt{3} = 0$