1. The number of real values of k for which the lines $x - 2y + 3 = 0$, $kx + 3y + 1 = 0$ and $4x - ky + 2 = 0$ are concurrent is
(a*) 0 (b) 1 (c) 2 (d) infinite

2. The equations of the sides AB, BC and CA of the ΔABC are $y - x = 2$, $x + 2y = 1$ and $3x + y + 5 = 0$ respectively. The equation of the altitude through B is
(a) $x - 3y + 1 = 0$ (b*) $x - 3y + 4 = 0$
(c) $3x - y + 2 = 0$ (d) none of these

3. The range of values of the ordinate of a point moving on the line $x = 1$, and always remaining in the interior of the triangle formed by the lines $y = x$, the x–axis and $x + y = 4$, is
(a*) (0, 1) (b) [0, 1] (c) [0, 4] (d) none of these

4. If A $(\sin\alpha, 1/\sqrt{2})$ and B $(1/\sqrt{2}, \cos\alpha)$, $-\pi \le \alpha \le \pi$, are two points on the same side of the line $x - y = 0$ then α belongs to the interval
(a*) $\left(-\frac{\pi}{4}, \frac{\pi}{4}\right) \cup \left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$ (b) $\left(-\frac{\pi}{4}, \frac{\pi}{4}\right)$
(c) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$ (d) none of these

5. The straight lines $L_1 = 4x - 3y + 2 = 0$, $L_2 = 3x + 4y - 4 = 0$ and $L_3 = x - 7y + 6 = 0$
(a) form a right–angled triangle (b) form a right–angled isosceles triangle
(c*) are concurrent (d) none of these

6. The equation of the bisector of that angle between the lines $x + y = 3$ and $2x - y = 2$ which contains the point (1, 1) is
(a*) $(\sqrt{5} - 2\sqrt{2})x + (\sqrt{5} + \sqrt{2})y = 3\sqrt{5} - 2\sqrt{2}$ (b) $(\sqrt{5} + 2\sqrt{2})x + (\sqrt{5} - \sqrt{2})y = 3\sqrt{5} + 2\sqrt{2}$
(c) $3x = 10$ (d) none of these

7. If the lines $y - x = 5$, $3x + 4y = 1$ and $y = mx + 3$ are concurrent then the value of m is
(a) 19/5 (b) 1 (c*) 5/19 (d) none of these

8. The points (–1, 1) and (1, –1) are symmetrical about the line
(a) $y + x = 0$ (b*) $y = x$ (c) $x + y = 1$ (d) none of these

9. Let P = (1, 1) and Q = (3, 2). The point R on the x–axis such that PR + RQ is the minimum is
(a*) $\left(\frac{5}{3}, 0\right)$ (b) $\left(\frac{1}{3}, 0\right)$ (c) (3, 0) (d) none of these

10. If a ray travelling along the line $x = 1$ gets reflected from the line $x + y = 1$ then the equation of the line along which the reflected ray travels is
(a*) $y = 0$ (b) $x - y = 1$ (c) $x = 0$ (d) none of these

11. The point P(2, 1) is shifted by $3\sqrt{2}$ parallel to the line $x + y = 1$, in the direction of increasing ordinate, to reach Q. The image of Q by the line $x + y = 1$ is
(a) (5, – 2) (b) (– 1, – 2) (c) (5, 4) (d*) (– 1, 4)

12. Let A = (1, 0) and B = (2, 1). The line AB turns about A through an angle $\pi/6$ in the clockwise sense, and the new position of B is B'. Then B' has the coordinates
(a*) $\left(\frac{3+\sqrt{3}}{2}, \frac{\sqrt{3}-1}{2}\right)$ (b) $\left(\frac{3-\sqrt{3}}{2}, \frac{\sqrt{3}+1}{2}\right)$
(c) $\left(\frac{1-\sqrt{3}}{2}, \frac{1+\sqrt{3}}{2}\right)$ (d) none of these

13. A line has intercepts a, b on the coordinate axes. If the axes are rotated about the origin through an angle α then the line has intercepts p, q on the new position of the axes respectively. Then

(a*) $\frac{1}{p^2}+\frac{1}{q^2}=\frac{1}{a^2}+\frac{1}{b^2}$ (b) $\frac{1}{p^2}-\frac{1}{q^2}=\frac{1}{a^2}-\frac{1}{b^2}$

(c) $\frac{1}{p^2}+\frac{1}{a^2}=\frac{1}{a^2}+\frac{1}{b^2}$ (d) none of these

14. Three vertices of a quadrilateral in order are (6, 1), (7, 2) and (–1, 0). If the area of the quadrilateral is 4 unit^2 then the locus of the fourth vertex has the equation

(a) $x - 7y = 1$ (b) $x - 7y + 15 = 0$

(c*) $(x - 7y)^2 + 14(x - 7y) - 15 = 0$ (d) none of these

15. A variable line through the point (a, b) cuts the axes of reference at A and B respectively. The lines through A and B parallel to the y–axis and the x–axis respectively meet at P. Then the locus of P has the equation

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

16. If each of the vertices of a triangle has integral coordinates then the triangle may be

(a*) right angled (b*) equilateral (c*) isosceles (d) none of these

17. If (α, β) be an end of a diagonal of a square and the other diagonal has the equation $x - y = \alpha$ then another vertex of the square can be

(a) $(\alpha - \beta, \alpha)$ (b*) $(\alpha, 0)$ (c) $(0, -\alpha)$ (d) * $(\alpha + \beta, \beta)$

18. A point on the line y = x whose perpendicular distance from the line $\frac{x}{4}+\frac{y}{3}=1$ is 4 has the coordinates

(a) $\left(-\frac{8}{7},\frac{8}{7}\right)$ (b) $\left(\frac{32}{7},\frac{32}{7}\right)$ (c) $\left(\frac{3}{2},\frac{3}{2}\right)$ (d*) none of these

19. The parametric equation of a line is given by $x = -2 + \frac{r}{\sqrt{10}}$ and $y = 1 + 3\frac{r}{\sqrt{10}}$. Then, for the line

(a*) intercept on the x–axis = 7/3 (b) intercept on the y–axis = – 7

(c*) slope of the line = $\tan^{-1} 1/3$ (d) slope of the line = $\tan^{-1} 3$

20. If the equations of the hypotenuse and a side of right–angled isosceles triangle be $x + my = 1$ and $x = k$ respectively then

(a*) $m = 1$ (b) $m = k$ (c*) $m = -1$ (d) $m + k = 0$

21. The centroid and a vertex of an equilateral triangle are (1, 1) and (1, 2) respectively. Another vertex of the triangle can be

(a*) $\left(\frac{1-\sqrt{3}}{2},\frac{1}{2}\right)$ (b) $\left(\frac{2+3\sqrt{3}}{2},\frac{1}{2}\right)$ (c*) $\left(\frac{2+\sqrt{3}}{2},\frac{1}{2}\right)$ (d) none of these

22. If one vertex of an equilateral triangle of side 2 is the origin and another vertex lies on the line $x = \sqrt{3}y$ then the third vertex can be

(a*) (0, 2) (b*) $(\sqrt{3}, -1)$ (c) (0, – 2) (d) $(\sqrt{3}, 1)$

23. A line passing through the origin and making an angle $\pi/4$ with the line $y - 3x = 5$ has the equation

(a) $x + 2y = 0$ (b) $2x = y$ (c*) $x = 2y$ (d*) $y + 2x = 0$

24. A line perpendicular to the line $3x - 2y = 5$ cuts off an intercept 3 on the positive side of the x–axis. Then
(a) the slope of the line is 2/3
(b*) the intercept on the y–axis is 2
(c*) the area of the triangle formed by the line with the axes is 3 unit^2
(d) none of these

25. If $bx + cy = a$, where a, b, c are of the same sign, be a line such that the area enclosed by the line and the axes of reference is 1/8 unit^2 then
(a) b, a, c are in GP (b*) b, 2a, c are in GP
(c) b, a/2, c are in GP (d*) b, – 2a, c are in GP

26. A line has intercepts a and b on the coordinate axes. If keeping the origin fixed, the coordinate axes are rotated through 90°, the same line has intercepts p and q, then
(a) p =a, q = b (b) p = b, q = a
(c) p = – b, q = – a (d) p = b, q = – a

27. The equations of the lines representing the sides of a triangle are $3x - 4y = 0$, $x + y = 0$ and $2x - 3y = 7$. The line $3x + 2y = 0$ always passes through the
(a) incentre (b) centroid (c) circumcentre (d) orthocentre

28. If the mid–points P, Q and R of the sides of the ΔABC are (3, 3), (3, 4) and (2, 4) respectively, then ΔABC is
(a) right angled (b) acute angled (c) obtuse angled (d) isosceles

29. If $a^2 + b^2 - c^2 - 2ab = 0$, then the family of straight lines $ax + by + c = 0$ is concurrent at the points
(a) (– 1, 1) (b) (1, – 1) (c) (1, 1) (d) (– 1, – 1)

30. The coordinates of the middle points of the sides of a triangle are (3, 2), (4, 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