POINT & STRAIGHT LINE
EXERCISE

1. If α, β, γ are the real roots of the equation $x^3 - 3px^2 + 3qx - 1 = 0$, then the centroid of the triangle whose vertices are $(\alpha, \frac{1}{\alpha})$, $(\beta, \frac{1}{\beta})$ and $(\gamma, \frac{1}{\gamma})$ is:-

(1) p, –q (2) (–p, q) (3) (p, q) (4) $\left(\frac{p}{2}, \frac{q}{2}\right)$

2. Number of straight lines from (1, 1) which make area of 1 sq. units with the coordinate axes is equal to -

(1) 0 (2) 1 (3) 2 (4) 3

3. If P is a moving point in the xy-plane in such a way that perimeter of triangle PQR is 16 {where $Q \equiv (3, \sqrt{5})$, $R \equiv (7, 3\sqrt{5})$} then maximum area of triangle PQR is :-

(1) 6 (2) 12
(3) 18 (4) 9

4. In a triangle ABC, co-ordinates of A are (1, 2) and the equations to the medians through B and C are x + y = 5 and x = 4 respectively. Then the co-ordinates of B and C will be:-

(1) (–2, 7), (4, 3)
(2) (7, –2), (4, 3)
(3) (2, 7), (–4, 3)
(4) (2, –7), (3, –4)

5. Consider the family of lines $x(a + b) + y = 1$, where a, b and c are the roots of the equation $x^3 - 3x^2 + x + \lambda = 0$ such that $c \in [1,2]$. If the given family of lines makes triangle of area 'A' with coordinate axis, then maximum value of 'A' (in sq. units) will be -

(1) $\frac{1}{4}$ (2) 1 (3) $\frac{1}{8}$ (4) $\frac{1}{2}$

6. The equations of bisectors of two lines L_1 & L_2 are $2x - 16y - 5 = 0$ and $64x + 8y + 35 = 0$. If the line L_1 passes through (– 11, 4), the equation of acute angle bisector of L_1 & L_2 is :

(1) $2x - 16y - 5 = 0$
(2) $64x + 8y + 35 = 0$
(3) data insufficient
(4) None of these

7. An insect is resting on the graph paper at a point A(3, 2). Now it starts moving towards west direction and covers a distance of 4 units and then it turns towards south and covered a distance of 3 units and reaches at point B then the polar co-ordinates of point B will be :-

(1) $\left(6\sqrt{2}, \frac{\pi}{4}\right)$ (2) $\left(\sqrt{2}, \frac{3\pi}{4}\right)$
(3) $\left(\sqrt{2}, \frac{-3\pi}{4}\right)$ (4) None of these

8. The equation of the perpendicular bisectors of the sides AB and AC of a triangle ABC are y = x and y = –x, respectively. If the point A is (1, 2), then the area of ΔABC is :-

(1) 6 sq. units (2) 3 sq. units
(3) 9 sq. units (4) 2 sq. units

9. Line AB passes through point (2, 3) and intersects the positive x and y axes at A(a, 0) and B(0, b) respectively. If the area of ΔAOB is 11, the numerical value of $4b^2 + 9a^2$, is :-

(1) 220 (2) 240
(3) 248 (4) 284

10. 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 constant is) :

(1) $x^2 + y^2 = 4p^2$ (2) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$
(3) $x^2 - y^2 = \frac{4}{p^2}$ (4) $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{p^2}$

11. The point $(a^2, a+1)$ is a point in the angle between the lines $3x - y + 1 = 0$ and $x + 2y - 5 = 0$ containing the origin, if-

(1) $a \geq 1$ or $a \leq -3$
(2) $a \in (0, 1)$
(3) $a \in (-3, 0) \cup \left(\frac{1}{3}, 1\right)$
(4) None of these

12. If area of the triangle formed by the centroid and two vertices of a triangle is 6 sq. unit then the area of the triangle will be :-

(1) 6 Sq. unit (2) 9 Sq. unit

(3) 18 Sq. unit (4) 9/2 Sq. unit

13. If (–2, 6) is the image of the point (4, 2) with respect to the line L = 0, then L =

(1) $3x - 2y + 5$ (2) $3x - 2y + 10$

(3) $2x + 3y - 5$ (4) $6x - 4y - 7$

14. The number of points, having both co-ordinates as integers, that lie in the interior of the triangle with vertices (0, 0), (0, 41) and (41, 0) is :

(1) 820 (2) 780

(3) 901 (4) 861

15. Number of lines that can be drawn through the point(4,–5) so that its distance from (–2,3) will be equal to 12 is equal to-

(1) 0 (2) 1

(3) 2 (4) 3

16. If the x intercept of the line y = mx + 2 is greater than 1/2 then the gradient of the line lies in the interval-

(1) (–1,0) (2) (–1/4,0)

(3) $(-\infty,-4)$ (4) (–4,0)

17. A line passes through (2,2) and cuts a triangle of area 9 square units from the first quadrant. The sum of all possible values for the slope of such a line, is-

(1) –2.5 (2) –2

(3) –1.5 (4) –1

18. A point P(x,y) moves so that the sum of the distance from P to the coordinate axes is equal to the distance from P to the point A(1,1). The equation of the locus of P in the first quadrant is -

(1) (x + 1) (y + 1) = 1

(2) (x + 1) (y + 1) = 2

(3) (x – 1)(y – 1) = 1

(4) (x – 1)(y – 1) = 2

19. If A and B are the points (–3,4) and (2,1), then the co-ordinates of the point C on AB produced such that AC = 2BC are :

(1) (2,4) (2) (3,7)

(3) (7,–2) (4) $\left(-\frac{1}{2},\frac{5}{2}\right)$

20. Two mutually perpendicular straight lines through the origin from an isosceles triangle with the line 2x + y = 5. Then the area of the triangle is :

(1) 5 (2) 3

(3) 5/2 (4) 1

21. If in triangle ABC, A ≡ (1,10),

circumcenter $\equiv\left(-\frac{1}{3},\frac{2}{3}\right)$ and orthocenter $\equiv\left(\frac{11}{3},\frac{4}{3}\right)$

then the co-ordinates of mid-point of side opposite to A is-

(1) (1,–11/3) (2) (1,5)

(3) (1,–3) (4) (1,6)

22. The line x= c cuts the triangle with corners (0,0); (1,1) and (9,1) into two region. For the area of the two regions to be the same c must be equal to-

(1) 5/2 (2) 3

(3) 7/2 (4) 3 or 15

23. If m and b are real numbers and mb > 0, then the line whose equation is y = mx + b cannot contain the point-

(1) (0,2009) (2) (2009,0)

(3) (0,–2009) (4) (20,–100)

24. If a and b are real numbers between 0 and 1 such that the points (a, 1) (1, b) and (0, 0) form an equilateral triangle, then a, b are -

(1) $2-\sqrt{3},2-\sqrt{3}$ (2) $\sqrt{3}-1,\sqrt{3}-1$

(3) $\sqrt{2}-1,\sqrt{2}-1$ (4) None of these

25. For a variable line $\frac{x}{a}+\frac{y}{b}=1$ where $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c^2}$ the locus of the foot of perpendicular drawn from origin to it is -

(1) $x^2 + y^2 = \frac{c^2}{2}$

(2) $x^2 + y^2 = c^2$

(3) $x^2 + y^2 = 2c$

(4) None of these

26. Two sides of on isosceles triangle are given by the equations $7x - y + 3 = 0$ and $x + y - 3 = 0$. If its third side passes through the point $(1, -10)$, then its equations are -

(1) $x - 3y - 7 = 0$ or $3x + y - 31 = 0$

(2) $x - 3y - 31 = 0$ or $3x + y - 7 = 0$

(3) $x - 3y - 31 = 0$ or $3x + y + 7 = 0$

(4) None of these

27. The incentre of the triangle formed by $x = 0$, $y = 0$ and $3x + 4y = 12$ is -

(1) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (2) $(1, 1)$

(3) $(1, \frac{1}{2})$ (4) $(\frac{1}{2}, 1)$

28. The point $(-4, 5)$ is the vertex of a square and one of its diagonal is $7x-y + 8 = 0$. The equation of the other diagonal is :-

(1) $7x-y = 23$ (2) $x + 7y = 31$

(3) $x - 7y = 31$ (4) None of these

29. A straight line through the point p(3, 4) is such that its intercept between the axis is bisect at p. Its equation is -

(1) $3x - 4y + 7 = 0$

(2) $4x + 3y = 24$

(3) $3x + 4y = 25$

(4) $x + y = 7$

30. If the straight line drawn through the point $P(\sqrt{3}, 2)$ and making an angle $\pi/6$ with x-axis meets the line $\sqrt{3}x - 4y + 8 = 0$ at Q then the length PQ is -

(1) 4 (2) 5

(3) 6 (4) None of these

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	3	3	2	2	4	1	3	2	1	2
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	3	3	1	2	1	4	1	2	3	1
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	1	2	1	1	2	3	2	2	2	3