

MISSION NDA MATHEMATICS

COMPLETE TOPICWISE QUESTIONS

STRAIGHT LINE

- The locus of the point which moves so that the difference of its distance from two straight lines which are at right angles is equal to the distance from another fixed straight line is
 - a straight line
 - a circle
 - a parabola
 - an ellipse
- The third vertex of an equilateral triangle whose vertices are $(2,4)$ and $(2,6)$ is
 - $(2 + \sqrt{3}, 5)$
 - $(2\sqrt{3}, 5)$
 - $(2,5)$
 - $(\sqrt{3}, 5)$
- Two vertices of a triangle are $(4, -3)$ and $(-2,5)$. If the orthocentre of the triangle is at $(1,2)$, then the third vertex is
 - $(-33, -26)$
 - $(33,26)$
 - $(26,33)$
 - none of these
- If a rod of length l slides with its ends on two perpendicular lines, then the locus of its mid-point is
 - $2x^2 + 2y^2 = l^2$
 - $4x^2 + 4y^2 = l^2$
 - $x^2 + y^2 = l^2$
 - $x^2 + 2y^2 = l^2$
- The circumcentre of the triangle formed by $A(3,7)$, $B(3-2)$, $C(5,7)$ is
 - $(3,7)$
 - $(3, -2)$
 - $(5,7)$
 - $(4,5/2)$
- The diagonals AC and BD of a rhombus intersect at $(5,6)$. If $A \equiv (3,2)$, then the equation of the diagonal BD is
 - $y - x = 1$
 - $2y - x = 7$
 - $y - 2x + 4 = 0$
 - $2y + x = 17$
- A straight line through the origin meets the parallel lines $4x + 4y = 9$ and $2x + y + 6 = 0$ at points P and Q respectively. Then the point O divides the segment PQ in the ratio
 - 1:2
 - 3:4
 - 2:1
 - 4:3
- The fourth vertex of the rhombus formed by the points $(-1,5)$, $(-2, -3)$, $(5,1)$ is
 - $(-6,9)$
 - $(6,9)$
 - $(6, -9)$
 - none of these
- If the point $P(a^2, a)$ lies in the region corresponding to the acute angle between the lines $2y = x$ and $4y = x$, then



- (a) $a \in (2,6)$ (b) $a \in (4,6)$
 (c) $a \in (2,4)$ (d) none of these
10. A ray of light passing through the point $(1,2)$ is reflected on the x -axis at a point P and passes through the point $(5,3)$. Then the abscissa of the points is
 (a) 3 (b) $13/3$
 (c) $13/5$ (d) $13/4$
11. The mid-points of AB, BC, CA of a $\triangle ABC$ are $(6, -1), (-4, -3), (2, -5)$ respectively. The centroid of $\triangle ABC$ is
 (a) $(4,1)$ (b) $(\frac{4}{3}, -3)$
 (c) $(\frac{4}{3}, 3)$ (d) $(-\frac{4}{3}, 3)$
12. A line is drawn perpendicular to the line $y = 5x$, meeting the coordinate axes at A and B . If the area of the triangle OAB is 10 sq. units, where O is the origin, then the equation of the drawn line is
 (a) $x + 5y = 10$ (b) $x - 5y = 10$
 (c) $x + 4y = 10$ (d) $x - 4y = 10$
13. The length of the perpendicular from the origin to a line is 7 and the line makes an angle 150° with the positive direction of the y -axis. The equation of the line is
 (a) $\sqrt{3}x + y = 14$ (b) $\sqrt{3}x - y = 14$
 (c) $\sqrt{3}x + y + 14 = 0$ (d) $\sqrt{3}x - y + 14 = 0$
14. The vertices of a triangle are $A(0,0), B(0,2)$ and $C(2,0)$. The distance between the circumcentre and orthocentre is
 (a) 0 (b) $\sqrt{2}$
 (c) $1/\sqrt{2}$ (d) none of these
15. The coordinates of two consecutive vertices A and B of a regular hexagon $ABCDEF$ are $(1,0)$ and $(2,0)$ respectively. The equation of the diagonal CE is
 (a) $\sqrt{3}x + y = 4$ (b) $x + \sqrt{3}y + 4 = 0$
 (c) $x + \sqrt{3}y = 4$ (d) none of these
16. The area of the parallelogram formed by the lines $4y - 3x = 1, 4y - 3x - 3 = 0, 3y - 4x + 1 = 0$ and $3y - 4x + 2 = 0$ is
 (a) $3/8$ (b) $2/7$
 (c) $1/6$ (d) none of these
17. The foot of the perpendicular from $(2,3)$ upon the line $4x - 5y + 8 = 0$ is
 (a) $(0,0)$ (b) $(1,1)$
 (c) $(\frac{41}{78}, \frac{128}{75})$ (d) $(\frac{78}{41}, \frac{128}{41})$
18. The equations of the lines which pass through the origin and are inclined at an angle $\tan^{-1} m$ to the line $y = mx + c$ are
 (a) $x = 0, 2mx + (m^2 - 1)y = 0$ (b) $y = 0, 2mx + (m^2 - 1)y = 0$
 (c) $y = 0, 2mx + (1 - m^2)y = 0$ (d) none of these
19. If t_1, t_2 and t_3 are distinct, the points $(t_1, 2at_1 + at_1^3), (t_2, 2at_2 + at_2^3)$ and $(t_3, 2at_3 + at_3^3)$ are collinear if
 (a) $t_1 t_2 t_3 = 1$ (b) $t_1 + t_2 + t_3 = t_1 t_2 t_3$
 (c) $t_1 + t_2 + t_3 = 0$ (d) $t_1 + t_2 + t_3 = -1$



20. The image (or reflection) of the point $(4, -13)$ in the line $5x + y + 6 = 0$ is
 (a) $(-1, -14)$ (b) $(3, 4)$
 (c) $(1, 2)$ (d) $(-4, 13)$
21. The equation of a straight line on which the length of the perpendicular from the origin is four units and the line makes an angle of 120° with the x -axis is
 (a) $x\sqrt{3} + y + 8 = 0$ (b) $x\sqrt{3} - y = 8$
 (c) $x\sqrt{3} + y = 8$ (d) $x - \sqrt{3}y + 8 = 0$
22. The area of the parallelogram formed by the lines $4y - 3x - a = 0$, $3y - 4x + a = 0$, $4y - 3x - 3a = 0$ and $3y - 4x + 2a = 0$ is
 (a) $\frac{a^2}{5}$ (b) $\frac{a^2}{7}$
 (c) $\frac{2a^2}{7}$ (d) $\frac{2a^2}{9}$
23. The equations of the lines on which the perpendiculars from the origin make 30° angle with the x -axis and which form a triangle of area $50/\sqrt{3}$ with axes are
 (a) $x + \sqrt{3}y \pm 10 = 0$ (b) $\sqrt{3}x + y \pm 10 = 0$
 (c) $x \pm \sqrt{3}y - 10 = 0$ (d) none of these
24. If a vertex of a triangle is $(1, 1)$ and the middle points of the two sides through it are $(-2, 3)$ and $(5, 2)$, then the centroid of the triangle is
 (a) $(\frac{5}{3}, 3)$ (b) $(\frac{5}{3}, -3)$
 (c) $(-\frac{5}{3}, 3)$ (d) $(-\frac{5}{3}, -3)$
25. If the distance between the straight lines $y = mx + c_1$ and $y = mx + c_2$ is $|c_1 - c_2|$, then
 (a) $m = 0$ (b) $m = 1$
 (c) $m = 2$ (d) $m = -2$
26. If the lines $ax + y + 1 = 0$, $x + by + 1 = 0$ and $x + y + c = 0$ (a, b and c being distinct and different from 1) are concurrent, then $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ is equal to
 (a) 1 (b) -1
 (c) 0 (d) none of these
27. If the lines joining the origin and points of intersection of $kx + hy = 2hk$ and the circle $(x - y)^2 + (y - k)^2 = a^2$ are perpendicular, then $h^2 + k^2 =$
 (a) 0 (b) a
 (c) a^2 (d) -1
28. If m_1 and m_2 are the roots of the equation $x^2 + (\sqrt{3} + 2)x + (\sqrt{3} - 1) = 0$, then the area of the triangle formed by the lines $y = m_1x$, $y = m_2x$ and $y = 2$ is
 (a) $\sqrt{33} - \sqrt{11}$ (b) $x\sqrt{33} + \sqrt{11}$
 (c) $\sqrt{33} + \sqrt{7}$ (d) none of these
29. Which pair of points lie on the same side of $3x - 8y - 7 = 0$?
 (a) $(0, -1)$ and $(0, 0)$ (b) $(4, -3)$ and $(0, 1)$
 (c) $(-3, -4)$ and $(1, 2)$ (d) $(-1, -1)$ and $(3, 7)$
30. If k is a parameter, then the equation of the family of lines parallel to the line $3x + 4y + 5 = 0$ is
 (a) $4x - 3y + k = 0$ (b) $3x - 4y + k = 0$
 (c) $3x + 4y + k = 0$ (d) $4x + 3y + k = 0$



31. The coordinates of the third vertex of an equilateral triangle whose two vertices are at $(3,4)$ and $(-2,3)$ are
 (a) $(1,1)$ or $(1,-1)$ (b) $\left(\frac{1+\sqrt{3}}{2}, \frac{7-5\sqrt{3}}{2}\right)$ or $\left(\frac{1-\sqrt{3}}{2}, \frac{7+5\sqrt{3}}{2}\right)$
 (c) $(-\sqrt{3}, \sqrt{3})$ or $(\sqrt{3}, -\sqrt{3})$ (d) none of these
32. The line passing through $(1,1)$ and parallel to the line $2x - 3y + 5 = 0$ is
 (a) $3x + 2y = 5$ (b) $2x - 3y + 1 = 0$
 (c) $3x - 2y = 1$ (d) $2x + 3y = 5$
33. If $x^2 + 2hxy + y^2 = 0$ represents the equation of the straight lines through the origin which make an angle α with the straight line $y + x = 0$, then which of the following is not true?
 (a) $\sec 2\alpha = h$ (b) $\cos \alpha = \sqrt{\frac{1+h}{2h}}$
 (c) $2\sin \alpha = \sqrt{\frac{1+h}{h}}$ (d) $\cot \alpha = \sqrt{\frac{h+1}{h-1}}$
34. If the sum of the squares of intercepts on the axes cut off by the tangents to the curve $x^{2/3} + y^{2/3} = a^{2/3}$ ($a > 0$) at $\left(\frac{a}{8}, \frac{a}{8}\right)$ is 2, then a has the value
 (a) 1 (b) 2
 (c) 4 (d) 8
35. If $xy + x + y + 1 = 0$, and $x + ay - 3 = 0$ are concurrent, then $a =$
 (a) 3 (b) -4
 (c) 2 (d) none of these
36. The lines $x \cos \alpha + y \sin \alpha = p_1$ and $x \cos \beta + y \sin \beta = p_2$ will be perpendicular if
 (a) $\alpha = \beta$ (b) $|\alpha - \beta| = \frac{\pi}{2}$
 (c) $\alpha = \frac{\pi}{2}$ (d) $\alpha \pm \beta = \frac{\pi}{2}$
37. The area of a parallelogram formed by the lines $ax \pm bx \pm c = 0$ is
 (a) $\frac{c^2}{ab}$ (b) $\frac{2c^2}{ab}$
 (c) $\frac{c^2}{2ab}$ (d) none of these
38. The equation of the straight line passing through the intersection of the lines $x - 2y = 1$ and $x + 3y = 2$ and parallel to $3x + 4y = 0$ is
 (a) $3x + 4y + 5 = 0$ (b) $3x + 4y - 10 = 0$
 (c) $3x + 4y - 5 = 0$ (d) $3x + 4y + 6 = 0$
39. 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 and b are
 (a) $2 - \sqrt{3}, 2 - \sqrt{3}$ (b) $\sqrt{3} - 1, \sqrt{3} - 1$
 (c) $\sqrt{2} - 1, \sqrt{2} - 1$ (d) none of these
40. If P and Q are the points $(-3,4)$ and $(2,1)$, then the coordinates of the point R on PQ produced such that $PR = 2QR$ are
 (a) $(2,4)$ (b) $(3,7)$
 (c) $(7,-2)$ (d) $\left(-\frac{1}{2}, \frac{5}{2}\right)$
41. If the foot of the perpendicular from the origin to a straight line is at the point $(3, -4)$, then the equation of the line is



- (a) $3x - 4y = 25$
(c) $4x + 3y - 25 = 0$
- (b) $3x - 4y + 25 = 0$
(d) $4x - 3y + 25 = 0$
42. The equation of a line through the point (1,2) whose distance from the point (3,1) has the greatest possible value is
(a) $y = x$
(c) $y = -2x$
- (b) $y = 2x$
(d) $y = -x$
43. If the equation $6x^2 - xy - 12y^2 - 8x + 29y - 14 = 0$ represents a pair of lines, then the angle between them is
(a) $\tan^{-1}(17/6)$
(c) $\pi/4$
- (b) $\tan^{-1}(3/4)$
(d) $\pi/3$
44. If a, b, c are in A.P., then the straight line $ax + by + c = 0$ will always pass through a fixed point whose coordinates are
(a) (1, -2)
(c) (1, 2)
- (b) (-1, 2)
(d) (-1, -2)
45. The angle between the lines represented by $x^2 + 2xy \sec \theta + y^2 = 0$ is
(a) 4θ
(c) θ
- (b) 2θ
(d) none of these
46. If the family of lines
 $(2\cos \theta + 3\sin \theta)x + (3\cos \theta - 5\sin \theta)y - (5\cos \theta - 2\sin \theta) = 0$
is concurrent at (x_1, y_1) and the family of lines $(a + 2b)x + (a - 3b)y + b - a = 0$ for different values of a and b is concurrent at (x_2, y_2) , then
(a) $x_2 + y_2 = x_1$
(c) $6x_2 + y_2 = 2x_1 + y_1$
- (b) $x_2 + y_2 = y_1$
(d) none of these
47. The sides of a triangle are $3x + 4y$, $4x + 3y$ and $5x + 5y$ units, where $x > 0, y > 0$. The triangle is
(a) right angled
(c) obtuse angled
- (b) acute angled
(d) isosceles
48. The acute angle between the lines $x - y = 0$ and $y = 0$ is
(a) $\pi/6$
(c) $\pi/3$
- (b) $\pi/4$
(d) $5\pi/6$
49. If the two vertices of a triangle are $(-2, 3)$ and $(5, -1)$, the orthocentre lies at the origin and the centroid on the line is $x + y = 7$, then the third vertex lies at
(a) (7, 4)
(c) (12, 21)
- (b) (8, 14)
(d) none of these
50. The straight line which is parallel to the x -axis and crosses the curve $y = \sqrt{x}$ at an angle of 45° is
(a) $x = 1/4$
(c) $x = 1/2$
- (b) $y = 1/4$
(d) $y = 1$
51. If the second-degree equation $x^2 + 2\sqrt{2}xy + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$ represents a pair of straight lines, the distance between them is
(a) 4
(c) 2
- (b) $4/\sqrt{3}$
(d) $2\sqrt{3}$



52. The area of the triangle with vertices (a, b) , (x_1, y_1) and (x_2, y_2) , where a, x_1, x_2 are in G.P. with common ratio r and b, y_1, y_2 are in G.P. with common ratio s , is
 (a) $ab(r-1)(s-1)(s-r)$ (b) $\frac{1}{2}ab(r+1)(s+1)(s-r)$
 (c) $\frac{1}{2}ab(r-1)(s-1)(s-r)$ (d) $ab(r+1)(s+1)(r-s)$
53. The area of the triangle formed by the two rays whose combined equation is $y = |x|$ and the line is $x + 2y = 2$ is
 (a) $8/3$ sq. unit ² (b) $4/3$ sq. unit ²
 (c) 4 sq. unit ² (d) $16/3$ sq. unit ²
54. If the angle between two straight lines represented by $2x^2 + 5xy + 3y^2 + 7y + 4 = 0$ is $\tan^{-1} m$, then m equals
 (a) 1 (b) 7
 (c) $1/5$ (d) $7/5$
55. The straight lines $x + y = 0$, $3x + y - 4 = 0$ and $x + 3y - 4 = 0$ form a triangle which is
 (a) isosceles (b) equilateral
 (c) right-angled (d) none of these
56. The equations of the sides of a triangle are $x = 0$, $y = m_1x + c_1$ and $y = m_2x + c_2$. The area of the triangle is
 (a) $\frac{c_1 - c_2}{m_1 - m_2}$ (b) $\frac{1}{2} \frac{(c_1 - c_2)^2}{m_1 - m_2}$
 (c) $\frac{1}{2} \frac{c_1 - c_2}{(m_1 - m_2)^2}$ (d) $\frac{(c_1 - c_2)^2}{(m_1 - m_2)^2}$
57. If the straight lines $2x + 3y - 1 = 0$, $x + 2y - 1 = 0$ and $ax + by - 1 = 0$ form a triangle with the origin as orthocentre, then (a, b) is given by
 (a) $(6, 4)$ (b) $(-3, 3)$
 (c) $(-8, 8)$ (d) $(0, 7)$
58. A point equidistant from the lines $4x + 3y + 10 = 0$, $5x - 2y + 26 = 0$ and $7x - 24y - 50 = 0$ is
 (a) $(1, -1)$ (b) $(1, 1)$
 (c) $(0, 0)$ (d) $(0, 1)$
59. The point of intersection of two lines given by $2x^2 - 5xy + 2y^2 - 3x + 3y + 1 = 0$ is
 (a) $(\frac{1}{2}, \frac{1}{3})$ (b) $(-\frac{1}{7}, -\frac{1}{7})$
 (c) $(-\frac{1}{3}, \frac{1}{3})$ (d) $(\frac{1}{3}, -\frac{1}{3})$
60. The value of K such that $3x^2 - 11xy + 10y^2 - 7x + 13y + K = 0$ may represent a pair of straight lines is
 (a) 3 (b) 4
 (c) 6 (d) 8
61. The triangle formed by the lines whose combined equation is $(y^2 - 4xy - x^2)(x + y - 1) = 0$ is
 (a) equilateral (b) right-angled
 (c) isosceles (d) obtuse-angled



62. The distance between the parallel lines given by $(x + 7y)^2 + 4\sqrt{2}(x + 7y) - 42 = 0$ is
 (a) 2 (b) 4
 (c) $4\sqrt{2}$ (d) $8\sqrt{2}$
63. The number of triangles formed by the curves $x^3 - x^2 - x - 2 = 0$ and $4x^2 + x^2y^2 + 2y^2 - 3xy^2 - 12x + 8 = 0$ is equal to
 (a) 0 (b) 1
 (c) 2 (d) 3
64. The angle between the lines given by $2x^2 - 7x + 3y^2 = 0$ is
 (a) 60° (b) 45°
 (c) 30° (d) $\tan^{-1}(7/6)$
65. A straight line passing through $P(3,1)$ meets the coordinate axes at A and B . It is given that the distance of this straight line from the origin O is maximum. The area of the triangle OAB is equal to
 (a) $50/3$ sq. units (b) $25/3$ sq. units
 (c) $20/3$ sq. units (d) $100/3$ sq. units
66. $A(1,3)$ and $C(7,5)$ are two opposite vertices of a square. The equation of a side through A is
 (a) $x + 2y - 7 = 0$ or $2x - y + 1 = 0$ (b) $x - 2y + 5 = 0$
 (c) $2x + y - 5 = 0$ (d) none of these
67. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, then
 (a) $\frac{a}{h} = \frac{b}{h} = \frac{f}{g}$ (b) $\frac{a}{h} = \frac{h}{b} = \frac{f}{g}$
 (c) $\frac{a}{h} = \frac{h}{b} = \frac{g}{f}$ (d) none of these
68. The vertices of a $\triangle ABC$ are $A(0,0)$, $B(-3,-1)$ and $C(-1,-3)$. The equation of a line parallel to BC and intersecting sides AB and AC whose distance from the origin is $1/2$ is
 (a) $x + y + \frac{1}{2} = 0$ (b) $x + y - \frac{1}{2} = 0$
 (c) $x + y - \frac{1}{\sqrt{2}} = 0$ (d) $x + y + \frac{1}{\sqrt{2}} = 0$
69. The centroid of the triangle whose three sides are given by the combined equation $(x^2 + 7xy + 2y^2)(y - 1) = 0$ is
 (a) $(-\frac{7}{3}, \frac{2}{3})$ (b) $(\frac{7}{3}, \frac{2}{3})$
 (c) $(\frac{2}{3}, 0)$ (d) none of these
70. The angle between the pair of lines represented by $x^2 - 7xy + 12y^2 = 0$ is
 (a) $\sin^{-1} \frac{1}{12}$ (b) $\sin^{-1} \frac{1}{13}$
 (c) $\sin^{-1} \frac{1}{\sqrt{170}}$ (d) $\sin^{-1} \frac{1}{\sqrt{85}}$



ANSWERS

1	(a)	2	(a)	3	(b)	4	(b)	5	(d)
6	(d)	7	(b)	8	(b)	9	(c)	10	(c)
11	(b)	12	(a)	13	(a)	14	(b)	15	(c)
16	(b)	17	(d)	18	(b)	19	(c)	20	(a)
21	(a), (c)	22	(c)	23	(b)	24	(a)	25	—
26	(a)	27	(c)	28	(b)	29	(d)	30	(c)
31	(b)	32	—	33	(c)	34	(c)	35	—
36	(b)	37	(b)	38	—	39	(a)	40	(c)
41	(a)	42	—	43	(a)	44	(a)	45	—
46	(a), (b), (c)	47	—	48	(b)	49	(d)	50	(c)
51	—	52	(c)	53	(b)	54	—	55	(a)
56	(b)	57	—	58	(c)	59	(d)	60	(b)
61	—	62	(a)	63	(a)	64	—	65	(a)
66	(a)	67	—	68	(d)	69	(a)	70	(c)

