**Coordinates and Straight Lines**

**Choose the most appropriate option (a, b, c or d)**

Q 1. If two vertices of an equilateral triangle have integral coordinates then the third vertex will have

(a) integral coordinates (b) coordinates which are rational

(c) at least one coordinate irrational (d) coordinates which are irrational

Q 2. If the line segment joining (2, 3) and (-1, 2) is divided internally in the ration 3 : 4 by the line x + 2y = k then k is

(a)  (b)  (c)  (d) 

Q 3. The polar coordinates of the vertices of a triangle are (0, 0) (3, π/2) and (3, π/6). Then the triangle is

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

Q 4. The point (a, b + c), (b, c + a), (c, a + b) are

(a) vertices of an equilateral triangle (b) collinear

(c) concyclic (d) none of these

Q 5. The incentre of the triangle formed by the axes and the line is

(a)  (b) 

(c)  (d) 

Q 6. In the ΔABC, the coordinates of B are (0, 0), AB = 2, ∠ABC = and the middle point of BC has the coordinates (2, 0). The centroid of the triangle is

(a)  (b)  (c)  (d) none of these

Q 7. The coordinates of three consecutive vertices of a parallelogram are (1, 3), (-1, 2) and (2, 5). The coordinates of the fourth vertex are

(a) (6, 4) (b) (4, 6) (c) (-2, 0) (d) none of these

Q 8. The area of the pentagon whose vertices are (4, 1), (3, 6), (-5, 1), (-3, -3) and (-3, 0) is

(a) 30 unit2 (b) 60 unit2 (c) 120 unit2 (d) none of these

Q 9. A point moves in the x-y plane such that the sum of its distances from two mutually perpendicular lines is always equal to 3. The area enclosed by the locus of the point is

(a) 18 unit2 (b) unit2 (c) 9 unit2 (d) none of these

Q 10. Let A = (1, 2), B = (3, 4) and let C = (x, y) be a point such that (x – 1)(x – 3) + (y – 2)(y – 4) = 0. If ar (ΔABC) = 1 then maximum number of positions of C in the x-y plane is

(a) 2 (b) 4 (c) 8 (d) none of these

Q 11. The points (α, β), (γ, δ), (α, δ) and (γ, β) taken in order, where α, β, γ, δ are different real numbers, are

(a) collinear (b) vertices of a square (c) vertices of a rhombus (d) concyclic

Q 12. The diagonals of a parallelogram PQRS are along the lines x + 3y = 4 and 6x – 2y = 7. The PQRS must be a

(a) rectangle (b) square (c) cyclic quadrilateral (d) rhombus

Q 13. The coordinates of the four vertices of a quadrilateral are (-2, 4), (-1, 2), (1, 2) and (2, 4) taken in order. The equation of the line passing through the vertex (-1, 2) and dividing the quadrilateral in two equal areas is

(a) x + 1 = 0 (b) x + y = 1 (c) x – y + 3 = 0 (d) none of these

Q 14. The equation of the straight line which passes through the point (-4, 3) such that the portion of the line between the axes is divided internally by the point in the ratio 5 : 3 is

(a) 9x – 20y + 96 = 0 (b) 9x + 20y = 24 (c) 20x + 9y + 53 = 0 (d) none of these

Q 15. The equation of the straight line which bisects the intercepts made by the axes on the line x + y = 2 and 2x + 3y = 6 is

(a) 2x = 3 (b) y = 1 (c) 2y = 3 (d) x = 1

Q 16. The equation of a straight line passing through the point (-2, 3) and making intercepts of equal length on the axes is

(a) 2x + y + 1 = 0 (b) x – y = 5 (c) x – y + 5 = 0 (d) none of these

Q 17. The foot of the perpendicular on the line 3x + y = λ drawn from the origin is C. If the line cuts the x-axis and y-axis at A and B respectively then BC : CA is

(a) 1 : 3 (b) 3 : 1 (c) 1 : 9 (d) 9 : 1

Q 18. The distance of the line 2x – 3y = 4 from the point (1, 1) in the direction of the lien x + y = 1 is

(a)  (b)  (c)  (d) none of these

Q 19. The four sides of a quadrilateral are given by the equation xy(x – 2)(y – 3) = 0. The equation of the line parallel to x – 4y = 0 that divides the quadrilateral in two equal areas is

(a) x – 4y + 5 = 0 (b) x – 4y – 5 = 0 (c) 4y = x + 1 (d) 4y + 1 = x

Q 20. 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)  (b)  (c)  (d) none of these

Q 21. ABC is an isosceles triangle in which A is (-1, 0), ∠A = 2π/3, AB = AC and AB is along the x-axis. If BC = then the equation of the line BC is

(a)  (b)  (c)  (d) none of these

Q 22. The graph of the function cos x . cos(x + 2) – cos2(x + 1) is a

(a) straight line passing through the point (0, -sin21) with slope 2

(b) straight line passing through the origin

(c) parabola with vertex (1, -sin2 1)

(d) straight line passing through the point (π/2, -sin21) and parallel to the x-axis

Q 23. If the points (-2, 0), (-1, 1/) and (cos θ, sin θ) are collinear then the number of value of θ ∈ [0, 2π] is

(a) 0 (b) 1 (c) 2 (d) infinite

Q 24. The limiting position of the point of intersection of the lines 3x + 4y = 1 and (1 + c)x + 3c2y = 2 as c tends to 1 is

(a) (-5, 4) (b) (5, -4) (c) (4, -5) (d) none of these

Q 25. The coordinate of the point on the x-axis which is equidistant from the points (-3, 4) and (2, 5) are

(a) (20, 0) (b) (-23, 0) (c)  (d) none of these

Q 26. The distance between the line 3x + 4y = 9 and 6x + 8y + 15 = 0 is

(a)  (b)  (c)  (d) none of these

Q 27. If a vertex of an equilateral triangle is the origin and the side opposite to it has the equation x + y = 1 then the orthocenter of the triangle is

(a)  (b)  (c)  (d) none of these

Q 28. The equation of the three sides of a triangle are x = 2, y + 1 = 0 and x + 2y = 4. The coordinates of the circumcentre of the triangle are

(a) (4, 0) (b) (2, -1) (c) (0, 4) (d) none of these

Q 29. L is a variable line such that the algebraic sum of the distances of the points (1, 1), (2, 0) and (0, 2) from the line is equal to zero. The line L will always pass through

(a) (1, 1) (b) (2, 1) (c) (1, 2) (d) none of these

Q 30. ABC is an equilateral triangle such that the vertices B and C lie on two parallel lines at a distance 6. If A lies between the parallel lines at a distance 4 from one of them the length of a side of the equilateral triangle is

(a) 8 (b)  (c)  (d) none of these

Q 31. If p and p' are the perpendiculars from the origin upon the lines x sec θ + y cosec θ = a and x cos θ - y sin θ = a cos 2θ respectively then

(a) 4p2 + p'2 = a2 (b) p2 + 4p'2 = a2 (c) p2 + p'2 = a2 (d) none of these

Q 32. Let the perpendiculars from any point on the line 2x + 11y = 5 upon the lines 24x + 7y = 20 and 4x – 3y = 2 have the lengths p and p' respectively. Then

(a) 2p = p' (b) p = p' (c) p = 2p' (d) none of these

Q 33. If P(1 + t/) be any point on a line then the range of values of t for which the point P lies between the parallel lines x + 2y = 1 and 2x + 4y = 15 is

(a)  (b)  (c)  (d) none of these

Q 34. There are two parallel lines, one of which has the equation 3x + 4y = 2. If the lines cut an intercept of length 5 on the line x + y = 1 then the equation of the other line is

(a)  (b)  (c)  (d) none of these

Q 35. If the intercept made on the line y = mx by lines y = 2 and y = 6 is less than 5 then the range of values of m is

(a)  (b)  (c)  (d) none of these

Q 36. If a, b, c are any three terms of an AP then the line ax + by + c = 0

(a) has a fixed direction (b) always passes through a fixed point

(c) always cuts intercepts on the axes such that their sum is zero

(d) forms a triangle with the axes whose area is constant

Q 37. If a, c, b are in GP then the line ax + by + c = 0

(a) has a fixed direction (b) always passes through a fixed point

(c) forms a triangle with the axes whose area is constant

(d) always cuts intercepts on the axes such that their sum is zero

Q 38. 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

Q 39. A family of lines is given by (1 + 2λ)x + (1 - λ)y + λ = 0, λ being the parameter. The line belonging to this family at the maximum distance from the point (1, 4) is

(a) 4x – y + 1 = 0 (b) 33x + 12y + 7 = 0 (c) 12x + 33y = 7 (d) none of these

Q 40. The members of the family of lines (λ + μ)x + (2λ + μ)y = λ + 2μ, where λ ≠ 0, μ ≠ 0, pass through the point

(a) (3, -1) (b) (-3, 1) (c) (1, 1) (d) none of these

Q 41. 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

Q 42. 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

Q 43. If the point (a, a) falls between the lines |x + y| = 2 then

(a) |a| = 2 (b) |a| = 1 (c) |a| < 1 (d) |a| < 

Q 44. If A(sin α, ) and B(, cos α), -π ≤ α ≤ π, are two point on the same side of the line x – y = 0 then α belongs to the interval

(a)  (b)  (c)  (d) none of these

Q 45. The straight lines L1 ≡ 4x – 3y + 2 = 0, L2 ≡ 3x + 4y – 4 = 0 and L3 ≡ x – 7y + 6 = 0

(a) form a right-angled triangle (b) from a right-angled isosceles triangle

(c) are concurrent (d) none of these

Q 46. The equation of bisector of the acute angle between the lines 2x – y + 4 = 0 and x – 2y = 1 is

(a) x + y + 5 = 0 (b) x – y + 1 = 0 (c) x – y = 5 (d) none of these

Q 47. The equation of the bisector of the acute angle between the lines 2x – y + 4 = 0 and x – 2y = 1 is

(a)  (b) 

(c) 3x = 10 (d) none of these

Q 48. Two lines 2x – 3y = 1 and x + 2y + 3 = 0 divide the x-y plane in four compartments which are named as shown in figure. Consider the locations of the points (2, -1), (3, 2) and (-1, -2). We get

(a) (2, -1) ∈ IV (b) (3, 2) ∈ III (c) (-1, -2) ∈ II (d) none of these

Figure

Q 49. If the lines y – x = 5, 3x + 4y = 1 and y = mx + 3 are concurrent then the value of m is

(a)  (b) 1 (c)  (d) none of these

Q 50. If the point (cos θ, sin θ) does not fall in that angle between the lines y = |x – 1| in which the origin lies then θ belongs to

(a)  (b)  (c) (0, π) (d) none of these

Q 51. 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

Q 52. The equations of the line segment AB is y = x. If A and B lie on the same side of the line mirror 2x – y = 1, the image of AB has the equation

(a) x + y = 2 (b) 8x + y = 9 (c) 7x – y = 6 (d) none of these

Q 53. Let P = (1, 1) and Q = (3, 2). The point R on the x-axis such that PR + RQ is the minimum is

(a)  (b)  (c) (3, 0) (d) none of these

Q 54. If a ray travelling along the 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

Q 55. The point P(2, 1) is shifted by 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, 4) (c) (3, -4) (d) (-3, 2)

Q 56. Let A = (1, 0) and B = (2, 1). The line AB turns about A through an angle π/6 in the clockwise sense, and the new position of B is B'. Then B' has the coordinates

(a)  (b)  (c)  (d) none of these

Q 57. 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)  (b)  (c)  (d) none of these

Q 58. Two points A and B move on the x-axis and the y-axis respectively such that the distance between the two points is always the same. The locus of the middle point of AB is

(a) a straight line (b) a pair of straight line (c) a circle (d) none of these

Q 59. Three vertices of a quadrilateral in order are (6, 1), (7. 2) and (-1, 0). If the area of the quadrilateral is 4 unit2 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

Q 60. 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)  (b)  (c)  (d) 

**Choose the correct options. One or more options may be correct.**

Q 61. If the coordinates of the vertices of a triangle are rational numbers then which of the following points of the triangle will always have rational coordinates ?

(a) centroid (b) Incentre (c) Circumcentre (d) Orthocentre

Q 62. Two consecutive vertices of a rectangle of area 10 unit2 are (1, 3) and (-2, -1). Other two vertices are

(a)  (b) (c)  (d) 

Q 63. The ends of a diagonal of a square are (2, -3) and (-1, 1). Another vertex of the square can be

(a)  (b)  (c)  (d) none of these

Q 64. 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

Q 65. If (-1, 2), (2, -1) and (3, 1) are any three vertices of a parallelogram then the fourth vertex (a, b) will be such that

(a) a = 2, b = 0 (b) a = -2, b = 0 (c) a = -2, b = 6 (d) a = 6, b = -2

Q 66. If (α, β) be an end of a diagonal of a square and the other diagonal has the equation x – y = α then another vertex of the square can be

(a) (α − β, α) (b) (α, 0) (c) (0, -α) (d) (α + β, β)

Q 67. A point on the line y = x whose perpendicular distance from the line is 4 has the coordinates

(a)  (b)  (c)  (d) none of these

Q 68. The parametric equation of a line is given by



Then, for the line

(a) intercept on the x-axis =  (b) intercept on the y-axis = -7

(c) slope of the line =  (d) slope of the line = tan-1 3

Q 69. One side of a square of length a is inclined to the x-axis at an angle α with one of the vertices of the square at the origin. The equation of a diagonal of the square is

(a) y(cos α - sin α) = x(cos α + sin α) (b) y(cos α + sin α) = x(cos α - sin α)

(c) y(sin α + cos α) – x(sin α - cos α) = a (d) y(sin α + cos α) + x(sin α - cos α) = a

Q 70. If the equations of the hypotenuse and a side of a right-angled isosceles triangles be x + my = 1 and x = k respectively then

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

Q 71. The centroid and a vertex of an equilateral triangle are (1, 1) and (1, 2) respectively. Another vertex of the triangle can be

(a)  (b)  (c)  (d) none of these

Q 72. If one vertex of an equilateral triangle of side 2 is the original and another vertex lies on the line x = then the third vertex can be

(a) (0, 2) (b) (, -1) (c) (0, -2) (d) (, 1)

Q 73. A line passing through the point (2, 2) and the axes enclose an area λ. The intercepts on the axes made by the line are given by the two roots of

(a) x2 – 2|λ|x + |λ| = 0 (b) x2 + |λ|x + 2|λ| = 0 (c) x2 - |λ|x + 2|λ| = 0 (d) none of these

Q 74. A line passing through the origin and making an angle π/4 with the line y – 3x = 5 has the equation

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

Q 75. The coordinates of a point on the line x + y = 3 such that the point is at equation distance from the line |x| = |y| are

(a) (3, 0) (b) (0, 3) (c) (-3, 0) (d) (0, -3)

Q 76. 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  (b) the intercept on the y-axis is 2

(c) the area of the triangle formed by the line with the axes is 3 unit2 (d) none of these

Q 77. One diagonal of a square is the portion of the line intercepted by the axes. Then an extremity of the other diagonal is

(a)  (b)  (c)  (d) 

Q 78. 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 unit2 then

(a) b, a, c are in GP (b) a, 2a, c are in GP (c) b, , c are in AP (d) b, -2a, c are in GP

Q 79. The sides of a triangle are x + y = 1, 7y = x and . Then the following is an interior point of the triangle.

(a) Circumcentre (b) Centroid (c) Incentre (d) Orthocentre

Q 80. If (x, y) be a variable point on the line y = 2x lying between the lines 2(x + 1) + y = 0 and x + 3(y – 1) = 0 then

(a) x∈ (b) x∈ (c) y∈  (d) y∈

Q 81. If the equations of the three sides of a triangle are x + y = 1, 3x + 5y = 2 and x – y = 0 then the orthocenter of the triangle lies on the line

(a) 5x – 3y = 2 (b) 3x – 5y + 1 = 0 (c) 2x – 3y = 1 (d) 5x – 3y = 1

Q 82. A ray travelling along the line 3x – 4y = 5 after being reflected from a line l travels along the line 5x + 12y = 13. Then the equation of the line l is

(a) x + 8y = 0 (b) x = 8y (c) 32x + 4y = 65 (d) 32x – 4y + 65 = 0

Q 83. A ray of light travelling along the line x + y = 1 is incident on the x-axis and after refraction it enters the other side of the x-axis by turning π/6 away from the x-axis. The equation of the line along which the refracted ray travels is

(a)  (b)  (c)  (d) none of these

1c 2a 3c 4b 5d 6b 7b 8a 9a 10b

11d 12d 13c 14a 15b 16c 17d 18a 19a 20c

21a 22d 23b 24a 25d 26b 27a 28a 29a 30c

31a 32b 33a 34d 35a 36b 37c 38a 39c 40a

41b 42a 43c 44a 45c 46b 47a 48a 49c 50b

51b 52c 53a 54a 55d 56a 57a 58c 59c 60c

61acd 62ac 63ab 64acd 65bd 66bd 67ab 68d 69ac 70ac

71ac 72ab 73c 74cd 75ab 76bc 77bc 78bd 79bc 80bd

81bd 82bc 83ac