Parabola

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

Q 1. Given the two ends of the latus rectum, the maximum number of parabolas that can be drawn is

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

Q 2. If the focus of a parabola is (-2, 1) and the directrix has the equation $x + y = 3$ then the vectex is

(a) (0, 3) (b) (-1, 1/2) (c) (-1, 2) (d) (2, -1)

Q 3. If the vertex and the focus of a parabola are (-1, 1) and (2, 3) respectively then the equation of the directrix is

(a) $3x + 2y + 14 = 0$ (b) $3x + 2y - 25 = 0$ (c) $2x - 3y + 10 = 0$ (d) none of these

Q 4. The vertex of a parabola is (a, 0) and the directix is $x + y = 3a$. The equation of the parabola is

(a) $x^2 + 2xy + y^2 + 6ax + 10ay + 7a^2 = 0$ (b) $x^2 - 2xy + y^2 + 6ax + 10ay + 2a^2 = 0$

(c) $x^2 - 2xy + y^2 - 6ax + 10ay = 2a^2$ (d) none of these

Q 5. If the vertex = (2, 0) and the extremities of the latus rectum are (3, 2) and (3, -2) then the equation of the parabola is

(a) $y^2 = 2x - 4$ (b) $x^2 = 4x - 8$ (c) $y^2 = 4x - 8$ (d) none of these

Q 6. Any point on the parabola whose focus is (0, 1) and the directrix is $x + 2 = 0$ is given by

(a) $(t^2 + 1, 2t - 1)$ (b) $(t^2 + 1, 2t + 1)$ (c) $(t^2, 2t)$ (d) $(t^2 - 1, 2t + 1)$

Q 7. The equation of the parabola whose vertex and focus are on the positive side of the x-axis at distances a and b respectively from the origin is

(a) $y^2 = 4(b - a)(x - a)$ (b) $y^2 = 4(a - b)(x - b)$ (c) $x^2 = 4(b - a)(y - a)$ (d) none of these

Q 8. The equation $x^2 + 4xy + 4y^2 - 3x - 6y - 4 = 0$ represents a

(a) circle (b) parabola (c) a pair of lines (d) none of these

Q 9. The equation $\lambda x^2 + 4xy + y^2 + \lambda x + 3y + 2 = 0$ represents a parabola if λ is

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

Q 10. The focus of the parabola $y^2 - x - 2y + 2 = 0$ is

(a) $\left(\frac{5}{4}, 1\right)$ (b) $\left(\frac{1}{4}, 0\right)$ (c) (1, 1) (d) none of these

Q 11. The vertex of the parabola $(y - a)^2 = 4a(x + a)$ is

(a) (-a, a) (b) (a, -a) (c) (-2a, 2a) (d) $\left(-\frac{a}{2},\frac{a}{2}\right)$

Q 12. The equation of the axis of the parabola $9y^2 - 16x - 12y - 57 = 0$ is

(a) $2x = 3$ (b) $y = 3$ (c) $3y = 2$ (d) $x + 3y = 3$

Q 13. The length of the latus rectum of the parabola

$$169\{(x-1)^2 + (y-3)^2\} = (5x - 12y + 17)^2 \text{ is}$$

(a) $\frac{14}{13}$ (b) $\frac{28}{13}$ (c) $\frac{12}{13}$ (d) none of these

Q 14. The length of the latus rectum of the parabola $x = ay^2 + by + c$ is

(a) $\frac{a}{4}$ (b) $\frac{a}{3}$ (c) $\frac{1}{a}$ (d) $\frac{1}{4a}$

Q 15. The parametric equation of a parabola is $x = t^2 + 1$, $y = 2t + 1$. The Cartesian equation of its directrix is

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

Q 16. If (2, -8) is at an end of a focal chord of the parabola $y^2 = 32x$ then the other end of the chord is

(a) (32, 32) (b) (32, -32) (c) (-2, 8) (d) none of these

Q 17. A line L passing through the focus of the parabola $y^2 = 4(x - 1)$ intersects the parabola in two distinct points. If 'm' be the slope of the line L then

(a) $-1 < m < 1$ (b) $m < -1$ or $m > 1$ (c) $m \in R$ (d) none of these

Q 18. The HM of the segments of a focal chord of the parabola $y^2 = 4ax$ is

(a) $4a$ (b) $2a$ (c) a (d) a^2

Q 19. The length of a focal chord of the parabola $y^2 = 4ax$ at a distance b from the vertex is c. Then

(a) $2a^2 = bc$ (b) $a^3 = b^2c$ (c) $ac = b^2$ (d) $b^2c = 4a^3$

Q 20. The parabola $y^2 = kx$ makes an intercept of length 4 on the line $x - 2y = 1$. Then k is

(a) $\frac{\sqrt{105}-5}{10}$ (b) $\frac{5-\sqrt{105}}{10}$ (c) $\frac{5+\sqrt{105}}{10}$ (d) none of these

Q 21. A double ordinate of the parabola $y^2 = 8px$ is of length 16p. The angle subtended by it at the vertex of the parabola is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) none of these

Q 22. The chord AB of the parabola $y^2 = 4ax$ cuts the axis of the parabola at C. If A = $(at_1^2, 2at_1)$, B = $(at_2^2, 2at_2)$ and AC : AB = 1 : 3 then

(a) $t_2 = 2t_1$ (b) $t_2 + 2t_1 = 0$ (c) $t_1 + 2t_2 = 0$ (d) none of these

Q 23. AB is a chord of the parabola $y^2 = 4ax$. If its equation is y = mx + c and it subtends a right angle at the vertex of the parabola then

(a) c = 4am (b) a = 4mc (c) c = -4am (d) a + 4mc = 0

Q 24. If 't_1' and 't_2' are the ends of a focal chord of the parabola $y^2 = 2x$ then

(a) $t_1^2 + t_2^2 = 2$ (b) $t_1 + t_2 = 1$ (c) $t_1t_2 = -1$ (d) none of these

Q 25. A ray of light moving parallel to the x-axis gets reflected from a parabolic mirror whose equation is $(y - 2)^2 = 4(x + 1)$. After reflection, the ray must pass through the point

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

Q 26. The equation of a parabola is $y^2 = 4x$. P(1, 3) and Q(1, 1) are two points in the x-y plane. Then, for the parabola

(a) P and Q are exterior points (b) P is an interior point while Q is an exterior point

(c) P and Q are interior points (d) P is an exterior point while Q is an interior point

Q 27. The point (a, 2a) is an interior point of the region bounded by the parabola $y^2 = 16x$ and the double ordinate through the focus. Then a belongs to the open interval

(a) a < 4 (b) 0 < a < 4 (c) 0 < a < 2 (d) a > 4

Q 28. The ends of a line segment are P(1, 3) and Q(1, 1). R is a point on the line segment PQ such that PR : QR = 1 : λ. If R is an interior point of the parabola $y^2 = 4x$ then

(a) $\lambda \in (0, 1)$ (b) $\lambda \in \left(-\frac{3}{5}, 1\right)$ (c) $\lambda \in \left(\frac{1}{2}, \frac{3}{5}\right)$ (d) none of these

Q 29. The range of values of λ for which the point (λ, -1) is exterior to both the parabola $y^2 = |x|$ is

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

Q 30. The number of points with integral coordinates that lie in the interior of the region common to the circle $x^2 + y^2 = 16$ and the parabola $y^2 = 4x$ is

(a) 8 (b) 10 (c) 16 (d) none of these

Q 31. The number of distinct real tangents that can be drawn from (0, -2) to the parabola $y^2 = 4x$ is

(a) one (b) two (c) zero (d) none of these

Q 32. The tangent to the parabola $y^2 = 4x$ at the points (1, 2) and (4, 4) meet on the line

(a) $x = 3$ (b) $x + y = 4$ (c) $y = 3$ (d) none of these

Q 33. The point of intersection of the tangents to the parabola $y^2 = 4x$ at the points, where the parameter 't' has the value 1 and 2, is

(a) (3, 8) (b) (1, 5) (c) (2, 3) (d) (4, 6)

Q 34. The triangle formed by the tangents to a parabola $y^2 = 4ax$ at the ends of the latus rectum and the double ordinate through the focus is

(a) equilateral (b) isosceles (c) right-angled isosceles

(d) dependent on the value of a for its classification

Q 35. If two tangents drawn from the point (α, β) to the parabola $y^2 = 4x$ be such that the slope of one tangent is double of the other then

(a) $\beta = \frac{2}{9}\alpha^2$ (b) $\alpha = \frac{2}{9}\beta^2$ (c) $2\alpha = 9\beta^2$ (d) none of these

Q 36. The tangents from the origin to the parabola $y^2 + 4 = 4x$ are inclined at

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

Q 37. If $y + b = m_1(x + a)$ and $y + b = m_2(x + a)$ are two tangent to the parabola $y^2 = 4ax$ then

(a) $m_1 + m_2 = 0$ (b) $m_1m_2 = 1$ (c) $m_1m_2 = -1$ (d) none of these

Q 38. The tangents to a parabola at the vertex V and any point P meet at Q. If S be the focus then SP, SQ, SV are in

(a) AP (b) GP (C) HP (d) none of these

Q 39. The equation of the common tangent to the equation parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is

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

Q 40 't_1' and 't_2' are two points on the parabola $y^2 = 4x$. If the chord joining them is a normal to the parabola at 't_1' then

(a) $t_1 + t_2 = 0$ (b) $t_1(t_1 + t_2) = 1$ (c) $t_1(t_1 + t_2) + 2 = 0$ (d) $t_1t_2 + 1 = 0$

Q 41. The normal to the curve $x = at^2$, $y = 2at$ at the point P(t) meets the curve again at Q(t'). Then t' is

(a) $t + \frac{1}{t}$ (b) $-t - \frac{2}{t}$ (c) $t + \frac{2}{t}$ (d) $t - \frac{1}{t}$

Q 42. The set of points on the axis of the parabola $y^2 = 4x + 8$ from which the 3 normals to the parabola are all real and different is

(a) $\{(k, 0) \mid k \le -2\}$ (b) $\{(k, 0) \mid k > -2\}$ (c) $\{(0, k) \mid k > -2\}$ (d) none of these

Q 43. The number of distinct normals that can be drawn from (-2, 1) to the parabola $y^2 - 4x - 2y - 3 = 0$ is

(a) 1 (b) 2 (c) 3 (d) 0

Q 44. If the line $y = x + k$ is a normal to the parabola $y^2 = 4x$ then k can have the value

(a) $2\sqrt{2}$ (b) 4 (c) -3 (d) 3

Q 45. The arithmetic mean of the ordinates of the feet of the normals from (3, 5) to the parabola $y^2 = 8x$ is

(a) 4 (b) 0 (c) 8 (d) none of these

Q 46. The area of the triangle formed by the tangent and the normal to the parabola $y^2 = 4ax$, both drawn at the same end of the latus rectum, and axis of the parabola is

(a) $2\sqrt{2}a^2$ (b) $2a^2$ (c) $4a^2$ (d) none of these

Q 47. If two of the three feet of normals drawn from a point to the parabola $y^2 = 4x$ be (1, 2) and (1, -2) then the third foot is

(a) $(2,2\sqrt{2})$ (b) $(2,-2\sqrt{2})$ (c) (0, 0) (d) none of these

Q 48. Let P, Q, R be three points on a parabola, normals at which are concurrent. The centroid of the ΔPQR must lie on

(a) a line parallel to the directrix (b) the axis of the parabola

(c) a line of slope 1 passing through the vertex (d) none of these

Q 49. The vertex of the parabola $y^2 = 8x$ is at the centre of a circle and the parabola cuts the circle at the ends of its latus rectum. Then the equation of the circle is

(a) $x^2 + y^2 = 4$ (b) $x^2 + y^2 = 20$ (c) $x^2 + y^2 = 80$ (d) none of these

Q 50. The length of the common chord of the parabola $2y^2 = 3(x + 1)$ and the circle $x^2 + y^2 + 2x = 0$ is

(a) $\sqrt{3}$ (b) $2\sqrt{3}$ (c) $\frac{\sqrt{3}}{2}$ (d) none of these

Q 51. The circle $x^2 + y^2 + 2\lambda x = 0$, $\lambda \in R$, touches the parabola $y^2 = 4x$ externally. Then

(a) $\lambda > 0$ (b) $\lambda < 0$ (c) $\lambda > 1$ (d) none of these

Q 52. The locus of the middle points of chords of a parabola which subtend a right angle at the vertex of the parabola is

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

Q 53. The locus of a point from which tangents to a parabola are at right angles is a

(a) straight line (b) pair of straight line (c) circle (d) parabola

Q 54. P is a point. Two tangents are drawn from it to the parabola $y^2 = 4x$ such that the slope of one tangent is three times the slope of the other. The locus of P is

(a) a straight line (b) a circle (c) a parabola (d) an ellipse

Q 55. The locus of the middle points of parallel chords of a parabola $x^2 = 4ay$ is a

(a) straight line parallel to the x-axis (b) straight line parallel to the y-axis

(c) circle 9d) straight line parallel to a bisector of the angles between the axes

Q 56. The locus of the middle points of chords of the parabola $y^2 = 8x$ drawn through the vertex is a parabola whose

(a) focus is (2, 0) (b) latus rectum = 8 (c) focus is (0, 2) (d) latus rectum = 4

Q 57. The locus of the points of trisection of the double ordinates of a parabola is a

(a) pair of lines (b) circle (c) parabola (d) straight line

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

Q 58. The parabola $x^2 + 2x - 4y = 0$ has

(a) vertex = (-1, -1) (b) latus rectum = 4 (c) focus = $\left(-1, \frac{3}{4}\right)$ (d) focus = $\left(0, -\frac{1}{4}\right)$

Q 59. The equation of a parabola is $25\{(x-2)^2 + (y+5)^2\} = (3x + 4y - 1)^2$. For this parabola

(a) vertex = (2, -5) (b) focus (2, -5) (c) directrix has the equation $3x + 4y - 1 = 0$

(d) axis has the equation $3x + 4y - 1 = 0$

Q 60. Let PQ be a chord of the parabola $y^2 = 4x$. A circle drawn with PQ as a diameter passes through the vertex V of the parabola. If ar (ΔPVQ) = 20 unit^2 then the coordinates of P are

(a) (16, 8) (b) (16, -8) (c) (-16, 8) (d) (-16, -8)

Q 61. The equation of a tangent to the parabola $y^2 = 9x$ from the point (4, 10) is

(a) $x - 4y + 36 = 0$ (b) $81x - 8y - 162 = 0$ (c) $9x - 4y + 4 = 0$ (d) $x - 4y - 36 = 0$

Q 62. If the tangents drawn from the point (0, 2) to the parabola $y^2 = 4ax$ are inclined at an angle $\frac{3\pi}{4}$ then the value of a is

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

Q 63. If the tangents to the parabola $y^2 = 4ax$ at (x_1, y_1), (x_2, y_2) cut at (x_3, y_3) then

(a) x_1, x_3, x_2 are in AP (b) x_1, x_3, x_2 are in GP (c) y_1, y_3, y_2 are in AP (d) y_1, y_3, y_2 are in GP

Q 64. The equation of a locus is $y^2 + 2ax + 2by + c = 0$. Then

(a) It is an ellipse (b) it is a parabola (c) its latus rectum = a (d) its latus rectum = 2a

Q 65. A tangent to the parabola $y^2 = 4ax$ is inclined at $\frac{\pi}{3}$ with the axis of the parabola. The point of contact is

(a) $\left(\frac{a}{3}, -\frac{2a}{\sqrt{3}}\right)$ (b) $(3a, -2\sqrt{3}a)$ (c) $(3a, 2\sqrt{3}a)$ (d) $\left(\frac{3}{a}, \frac{2a}{\sqrt{3}}\right)$

Q 66. A chord PP' of a parabola cuts the axis of the parabola at O. The feet of the perpendicular from P and P' on the axis are M and M' respectively. If V is the vertex then VM, VO, VM' are in

(a) AP (b) GP (c) HP (d) none of these

Q 67. Let the equations of a circle and a parabola be $x^2 + y^2 - 4x - 6 = 0$ and $y^2 = 9x$ respectively. Then

(a) (1, -1) is a point on the common chord of contact

(b) the equation of the common chord is $y + 1 = 0$

(c) the length of the common chord is 6

(d) none of these

Q 68. The equation of a common tangent to the parabola $y^2 = 2x$ and the circle $x^2 + y^2 + 4x = 0$ is

(a) $2\sqrt{6}x + y = 12$ (b) $x + 2\sqrt{6}y + 12 = 0$ (c) $x - 2\sqrt{6}y + 12 = 0$ (d) $2\sqrt{6}x - y = 12$

Q 69. Let there be two parabolas with the same axis, focus of each being exterior to the other and the latus recta being 4a and 4b. The locus of the middle points of the intercepts between the parabolas made on the lines parallel to the common axis is a

(a) straight line if $a = b$ (b) parabola if $a \neq b$ (c) parabola for all a, b (d) none of these

Q 70. P is a point which moves in the x-y plane such that the point P is nearer to the centre of a square than any of the sides. The four vertices of the square are $(\pm a, \pm a)$. The region in which P will moved is bounded by parts of parabolas of which one has the equation

(a) $y^2 = a^2 + 2ax$ (b) $x^2 = a^2 + 2ay$ (c) $y^2 + 2ax = a^2$ (d) none of these

Answers

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