MATHS

BOOKS - ARIHANT MATHS (ENGLISH)

PARABOLA

Examples

1. Find the locus of a point , which moves such that its distance from the point $(0, -1)$ is twice its distance from the line $3x + 4y + 1 = 0$

Watch Video Solution

2. What conic does the equation

$25\left(x^2+y^2-2x+1\right)=(4x-3y+1)^2$ represent?

Watch Video Solution

3. What conic does

$13x^2-18xy+37y^2+2x+14y-2=0$ represent?

Watch Video Solution

4. Statement I: The conic $\sqrt{a}x+\sqrt{b}y=1$ represents a parabola.

Statement II: Conic $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a parabola if $h^2=ab$.

Watch Video Solution

5. If the equation $x^2 - y^2 - 2x + 2y + \lambda = 0$ represent a degenerate conic . Find the value of λ.

Watch Video Solution

6. If the equation $x^2 - y^2 - 2x - 2y + c = 0$ represent an empty set , then find the value of c.

Watch Video Solution

7. IF the equation of conic $2x^2 + xy + 3y^2 - 3x + 5y + \lambda = 0$ represent a single point, then find the value of λ

Watch Video Solution

8. For What value of λ the equation of conic 2xy+4x-6y+λ=0 represents two intersecting straight lines, if $\lambda = 17$, then this equation represents?

Watch Video Solution

9. The centre of the conic $14x^2 - 4xy + 11y^2 - 44x - 58y + 71 = 0,$ is

Watch Video Solution

10. Find the equation of the parabola whose focus is at (-1,-2) and the directrix the line $x - 2y + 3 = 0$

Watch Video Solution

11. Find the equation of the parabola whose focus is (4,-3) and vertex is (4,-1).

Watch Video Solution

12. The focal distance of a point on a parabola $y^2 = 8x$ is 8. Find it .

Watch Video Solution

13. PQ is a double ordinate of a parabola $y^2 = 4ax$. Find the locus of its points of trisection.

Watch Video Solution

14. If y_1, y_2, y_3 be the ordinates of a vertices of the triangle inscribed in a parabola $y^3 = 4ax,$ then show that the area of the triangle is $\frac{1}{8a}|(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$.

Watch Video Solution

15. An equilateral triangle is inscribed in the parabola $y^2 = 4ax$ whose vertex is at the vertex of the parabola .Find the length of its side.

Watch Video Solution

16. Prove that the equation of the parabola whose focus is (0, 0) and tangent at the vertex is $x - y + 1 = 0$ is $x^2 + y^2 + 2xy - 4x + 4y - 4 = 0$.

Watch Video Solution

17. Find the equation of the parabola whose latus-rectum is $4units$, axis is the line $3x + 4y - 4 = 0$ and the tangent at the vertex is the line $4x - 3 + 7 = 0$.

Watch Video Solution

18. Find the vertex, focus, and directrix of the following parabolas:

$x^2 + 8x + 12y + 4 = 0$

Watch Video Solution

19. Prove that the equation $y^2 + 2ax + 2by + c = 0$ represents a parabola whose axis is parallel to the axis of x. Find its vertex.

Watch Video Solution

20. Derive the equation of the parabola with its vertex at $(3, 2)$ and its focus at $(5, 2)$.

Watch Video Solution

21. Find the equation of the parabola with latusrectum joining the points (3,6) and (3,-2).

Watch Video Solution

22. Find the equation to the parabola whose axis parallel to the y-axis and which passes through the points (0,4)(1,9) and (4,5) and determine its latusrectum.

Watch Video Solution

23. Show that the point (2,3) lies outside the parabola $y^2 = 3x$.

Watch Video Solution

24. Find the position of the point (-2,2) with respect to the parabola $y^2 - 4y + 9x + 13 = 0$.

Watch Video Solution

25. If the point $(at^2, 2at)$ be the extremity of a focal chord of parabola $y^2 = 4ax$ then show that the length of the focal chord is $a\left(t + \frac{1}{t}\right)^2$.

Watch Video Solution

26. Prove that the semi-latus rectum of the parabola y^(2) = 4ax` is the harmonic mean between the segments of any focal chord of the parabola.

Watch Video Solution

27. Show that the focal chord, of parabola $y^2 = 4ax$, that makes an angle α with the x-axis is of length $4a \cos ec^2 \alpha$.

Watch Video Solution

28. Prove that the length of a focal chord of a parabola varies inversely as the square of its distance from the vertex.

Watch Video Solution

29. If the line $lx + my + n = 0$ touches the parabola $y^2 = 4ax$, prove that $\ln = am^2$

Watch Video Solution

30. Show that $x\cos\alpha + a\sin^2\alpha = p$ touches the parabola $y^2 = 4ax$ if $p\cos\alpha + a\sin^2\alpha = 0$ and that the point of contact is $(a\tan^2\alpha, -2a\tan\alpha)$.

Watch Video Solution

31. Prove that the line $\frac{x}{l} + \frac{y}{m} = 1$ touches the parabola $y^2 = 4a(x+b)$, if $m^2(l+b) + al^2 = 0$.

Watch Video Solution

32. Find the equation of the straight lines touching both $x^2 + y^2 = 2a^2$ and $y^2 = 8ax$.

Watch Video Solution

33. Find the equation of common tangent of $y^2 = 4ax$ and $x^2 = 4by$.

Watch Video Solution

34. Two tangents to the parabola $y^2 = 4ax$ make supplementary angles with the x-axis. Then the locus of their point of intersection is

Watch Video Solution

35. Show that the locus of the point of intersection of mutually perpendicular tangetns to a parabola is its directrix.

Watch Video Solution

36. The tangents to the parabola $y^2 = 4ax$ at $P\left(at_1^2, 2at_1\right)$, and $Q\left(at_2^2, 2at_2\right)$, intersect at R. Prove that the area of the triangle PQR is $\frac{1}{2}a^2(t_1 - t_2)^3$

Watch Video Solution

37. Show that normal to the parabols $y^2 = 8x$ at the point (2,4) meets it again at (18.-12) . Find also the length of the normal chord.

Watch Video Solution

38. Prove that the chord $y\sqrt{2}x + 4a\sqrt{2} = 0$ is a normal chord of the parabola $y^2 = 4ax$. Also, find the point on the parabola where the given chord is normal to the parabola.

Watch Video Solution

39. about to only mathematics

Watch Video Solution

40. Prove that the normal chord to a parabola at the point whose ordinate is equal to the abscissa subtends a right angle at the focus.

Watch Video Solution

41. If the normal to the parabola $y^2 = 4ax$ at point t_1 cuts the parabola again at point t_2 , then prove that $(t_2)^2 \geq 8$.

Watch Video Solution

42. If two of the three feet of normal drawn from a point to the parabola $y^2 = 4x$ are (1, 2) and (1,-2), then find the third foot.

Watch Video Solution

43. The locus of the point through which pass three normals to the parabola $y^2 = 4ax$, such that two of them make angles $\alpha \& \beta$ respectively with the axis & $\tan\alpha \cdot \tan\beta = 2$ is $(a > 0)$

Watch Video Solution

44. Find the locus of a point which is such that, the three normals through it cut the axis in points whose distance from the vertex are in A.P.

Watch Video Solution

45. Find the point on the axis of the parabola $3y^2 + 4y - 6x + 8 = 0$ from where three distinct normals can be drawn.

Watch Video Solution

46. A circle cuts the parabola $y^2 = 4ax$ at right angles and passes through the focus , show that its centre lies on the curve $y^2(a + 2x) = a(a + 3x)^2$.

Watch Video Solution

47. Show that the length of the chord of contact of the tangents drawn from (x_1, y_1) to the parabola $y^2 = 4ax$ is $\frac{1}{a}\sqrt{(y_1^2 - 4ax_1)(y_1^2 + 4a^2)}$

Watch Video Solution

48. Area of the triangle formed by the tangents from (x_1, y_1) to the parabola $y^2 = 4ax$ and its chord of contact is $\frac{(y_1^2 - 4ax_1)^{\frac{3}{2}}}{2a} = \frac{S_{11}^{\frac{3}{2}}}{2a}$

Watch Video Solution

49. Find the locus of the middle points of the chords of the parabola $y^2 = 4ax$ which subtend a right angle at the vertex of the parabola.

Watch Video Solution

50. The locus of the middle points of normal chords of the parabola $y^2 = 4ax$ is-

Watch Video Solution

51. If the diameter through any point P of a parabola meets any chord in A and the tangent at the end of the chord meets the diameter in B and C, then prove that $PA^2 = PB.PC$

Watch Video Solution

Watch Video Solution

52. Find the equations of the tangent and normal to the parabola $y^2 = 4ax$ at the point $(at^2, 2at)$.

Watch Video Solution

53. A ray of light is coming along the line $y = b$ from the positive direction of x-axis and striks a concave mirror whose intersection with xy-plane is a parabola $y^2 = 4ax$. Find the equation of the reflected ray and show that it passes through the focus of the parabola. Both a and b are positive.

Watch Video Solution

54. Find the length of latusrectum intersect at the focus S its coordinate are detained by solving.

Watch Video Solution

55. A ray of light travels along a line $y = 4$ and strikes the surface of curves $y^2 = 4(x + y)$. Then the equations of the line along which of reflected ray travels is $x = 0$ (b) $x = 2$ (c) $x + y$ (d) $2x + y = 4$

A. x=0

B. x=2

C. x+y=4

D. 2x+y=4

Answer: A

Watch Video Solution

56. A parabola is drawn with focus at (3,4) and vertex at the focus of the parabola $y^2 - 12x - 4y + 4 = 0$. The equation of the parabola is

A. $x^2 - 6x + 8y + 25 = 0$

B. $y^2 - 8x - 6y + 25 = 0$

C. $x^2 - 6x + 8y - 25 = 0$

D. $x^2 + 6x - 8y - 25 = 0$

Answer: D

Watch Video Solution

57. Two parabolas have the same focus. If their directrices are the x- and the y-axis, respectively, then the slope of their common chord is ± 1 (b) $\frac{4}{3}$ (c) $\frac{3}{4}$ (d) none of these

A. ± 1

B. $\frac{4}{3}$

C. $\frac{3}{4}$

D. None of these

Answer: A

Watch Video Solution

58. Let us define a region R is xy-plane as a set of points (x,y) satisfying $\left[x^2\right] = [y]$ (where [x] denotes greatest integer $\leq x$),then the region R defines

A. a parabola whose axis is horizontal

B. a parabola whose axis is vertical

C. integer point of the parabola $y = x^2$

D. None of the above

Answer: D

Watch Video Solution

59. The minimum area of circle which touches the parabolas $y = x^2 + 1$ and $y^2 = x - 1$ is $\frac{9\pi}{16} squnit$ (b) $\frac{9\pi}{32} squnit$

$\frac{9\pi}{8}$ $squnit$ (d) $\frac{9\pi}{4}$ $squnit$

A. (a) $\frac{9\pi}{16}$ sq units

B. (b) $\frac{9\pi}{32}$ sq units

C. $\frac{9\pi}{8}$ sq units

D. $\frac{9\pi}{4}$ sq units

Answer: B

Watch Video Solution

60. If a line $x + y = 1$ cut the parabola $y^2 = 4ax$ in points A and B and normals drawn at A and B meet at C. The normals to the parabola from C other than above two meets the parabola in D, then point D is : (A) (a, a) (B) $(2a, 2a)$ (C) $(3a, 3a)$ (D) $(4a, 4a)$

A. (a,2a)

B. $\left(\frac{4am}{l^2}, \frac{4a}{l}\right)$

C. $\left(\frac{2am^2}{l^2}, \frac{2a}{l}\right)$

D. $\left(\frac{4am^2}{l^2}, \frac{4am}{l}\right)$

Answer: D

Watch Video Solution

61. If d is the distance between the parallel tangents with positive slope to $y^2 = 4x$ and $x^2 + y^2 - 2x + 4y - 11 = 0$, then `10

A. $10 < d < 20$

B. $4 < d < 6$

C. $d < 4$

D. None of these

Answer: C

Watch Video Solution

62. Two parabolas C and D intersect at two different points, where C is $y = x^2 - 3$ and D is $y = kx^2$. The intersection at which the x value is positive is designated Point A, and x=a at this intersection the tangent line l at A to the curve D intersects curve C at point B , other than A. IF x-value of point B is 1, then a equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

63.

$$\min\left[(x_1-x_2)^2+\left(5+\sqrt{1-x_1^2}-\sqrt{4x_2}\right)^2\right],\ \forall x_1, x_2 \in R,$$

is (a)$4\sqrt{5}+1$ (b) $3-2\sqrt{2}$ (c)$\sqrt{5}+1$ (d) $\sqrt{5}-1$

A. $4\sqrt{5}+1$

B. $3-2\sqrt{2}$

C. $\sqrt{5}+1$

D. $\sqrt{5}-1$

Answer: B

Watch Video Solution

64. The condition that the parabolas $y^2 = 4c(x - d)$ and $y^2 = 4ax$ have a common normal other than X-axis $(a > 0, c > 0)$ is

A. $2a < 2c + d$

B. $2c < 2a + d$

C. $2d < 2a + c$

D. $2d < 2c + a$

Answer: A

Watch Video Solution

65. The locus of the midpoint of the focal distance of a variable point moving on theparabola $y^2 = 4ax$ is a parabola whose (a)latus rectum is half the latus rectum of the original parabola (b)vertex is $\left(\frac{a}{2}, 0\right)$ (c)directrix is y-axis. (d)focus has coordinates (a, 0)

A. latusrectum is half the latusrectum of the original parabola

B. Vertex is $\left(\frac{a}{2}, 0\right)$

C. directrix is Y-axis

D. focus has the coordinate (a,0)

Answer: D

Watch Video Solution

66. IF P_1P_2 and Q_1Q_2 two focal chords of a parabola $y^2 = 4ax$ at right angles, then

A. area of the quadrilateral $P_1Q_1P_2Q_2$ is minimum when the chords are inclined at an angle $\pi/4$ to the axis of the parabola.

B. minimum area is twice the area of the square on the latusrectum of the parabola.

C. minimum area of quadrilateral $P_1Q_1P_2Q_2$ cannot be found

D. minimum area is thrice the area of the square on the latusrectum of the parabola.

Answer: A

Watch Video Solution

67. The equation of the line that touches the curves $y = x|x|$ and $x^2 + (y-2)^2 = 4$, where $x \neq 0$, is:

A. $y = 4\sqrt{5}x + 20$

B. $y = 4\sqrt{3}x - 12$

C. $y = 0$

D. $y = -4\sqrt{5}x - 20$

Answer: A

Watch Video Solution

68. Let V be the vertex and L be the latusrectum of the parabola $x^2 = 2y + 4x - 4$. Then the equation of the parabola whose vertex is at V. Latusrectum $L/2$ and axis s perpendicular to the axis of the given parabola.

A. $y^2 = x - 2$

B. $y^2 = x - 4$

C. $y^2 = 2 - x$

D. $y^2 = 4 - x$

Answer: A,C

Watch Video Solution

69. about to only mathematics

A. $\left(\frac{a}{2}, a\right)$

B. $\left(\frac{a}{2}, -a\right)$

C. $\left(-\frac{a}{2}, a\right)$

D. $\left(-\frac{a}{2}, -a\right)$

Answer: A

Watch Video Solution

70. Find $\frac{dy}{dx} at (6, 1)$ if $y^2 = 4ax$

Watch Video Solution

71. Find $\frac{dy}{dx}$ if $2x - 3y = e^x$

Watch Video Solution

Watch Video Solution

72. Tangents are drawn to the parabola $y^2 = 4x$ at the point P which is the upper end of latusrectum . Area enclosed by the tangent line at, P,X axis and the parabola is

A. $\frac{2}{3}$sq units

B. $\frac{4}{3}$ sq units

C. $\frac{14}{3}$ sq units

D. $\frac{16}{3}$ sq units

Answer: A

Watch Video Solution

73. Let C_1 and C_2 be respectively, the parabolas $x^2 = y - 1$ and $y^2 = x - 1$ Let P be any point on C_1 and Q be any point on C_2 . Let P_1 and Q_1 be the refelections of P and Q, respectively with respect to the line y=x.

If the point $p(\pi, \pi^2 + 1)$ and $Q(\mu^2 + 1, \mu)$ then P_1 and Q_1 are

A. $(\pi^2 + 1, \pi)$ and $(\mu^2 + 1, \mu)$

B. $(\mu^2 + 1, \mu)$ and $(\mu, \mu^2 + 1)$

C. $(\mu, \mu^2 + 1)$ =and $(\mu, \mu^2 + 1)$

D. $(\pi, \pi^2 + 1)$ =and $(\mu^2, 1 + \mu)$

Answer: B

Watch Video Solution

74. Let C_1 and C_2 be respectively, the parabolas $x^2 = y - 1$ and $y^2 = x - 1$ Let P be any point on C_1 and Q be any point on C_2 . Let P_1 and Q_1 be the refelections of P and Q, respectively with respect to the line y=x.

Arithemetic mean of $PP_1$and QQ_1 is always less than

A. PQ

B. $\frac{1}{2}$PQ

C. 2PQ

D. $\frac{3}{2}$PQ

Answer: A

Watch Video Solution

75. about to only mathematics

Watch Video Solution

76. Find $\frac{dy}{dx}$ if $y^2 = 4ax$

Watch Video Solution

77. (a) Statement I is true, Statement II is true , Statement II is a correct explanation for statement I.

(b) Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I.

(C) Statement I is true, Statement II is false.

(D) Statement I is false , Statement II is true.

Statement I through the point $(\pi, \pi + 1), \pi < 2$, there

cannot be more than one normal to the parabola $y^2 = 4ax$.

Statement II The point $(\pi, \pi + 1)$ cannot lie inside the parabola $y^2 = 4ax$.

Watch Video Solution

78. Find $\frac{dy}{dx}$ if $y^2 = 2ax$

Watch Video Solution

79. Parabola $y^2 = 4a(x - c_1)$ and $x^2 = 4a(y - c_2)$, where $c_1 and c_2$ are variable, are such that they touch each other. The locus of their point of contact is (a)$xy = 2a^2$ (b) $xy = 4a^2$ (c)$xy = a^2$ (d) none of these

Watch Video Solution

80. Show that the area formed by the normals to $y^2 = 4ax$ at the points t_1, t_2, t_3 is

Watch Video Solution

81. If the parabolas $y^2 = 4ax$ and $y^2 = 4c(x - b)$ have a common normal other than the x-axis $(a, b, c$ being distinct positive real numbers), then prove that $\frac{b}{a - c} > 2$.

Watch Video Solution

82. If on a given base BC, a triangle is described such that the sum of the tangents of the base angles is m, then prove that the locus of the opposite vertex A is a parabola.

Watch Video Solution

83. A parabola mirror is kept along $y^2 = 4x$ and two light rays parallel to its axis are reflected along one straight line. If one of the incident light rays is at 3 units distance from the axis, then find the distance of the other incident ray from the axis.

Watch Video Solution

84. Prove that the length of the intercept on the normal at the point $P\left(at^2, 2at\right)$ of a parabola $y^2 = 4ax$ made by the circle described on the line joining the focus and P as diameter is $a\sqrt{1+t^2}$.

Watch Video Solution

85. If parabola of latus rectum l touches a fixed equal parabola, the axes of the two curves being parallel, then the locus of the vertex of the moving curve is

Watch Video Solution

86. Find the slope of normal to the curve if equation of the curve is $y = x^2 + x - 2$ at (1,2)

Watch Video Solution

87. TP and TQ are any two tangents to a parabola and the tangent at a third point R cuts them in P' and Q'. Prove that $\frac{TP'}{TP} + \frac{TQ'}{TQ} = 1$

Watch Video Solution

88. Prove that on the axis of any parabola there is a certain point 'k' which has the property that, if a chord PQ of parabola be drawn through it then $\frac{1}{(PK)^2} + \frac{1}{(QK)^2}$ is the same for all positions of the chord.

Watch Video Solution

89. If the distribution of weight is uniform, then the rope of the suspended bridge takes the form of parabola.The height of the supporting towers is 20m, the distance between these towers is 150m and the height of the lowest point of the rope from the road is 3m. Find the equation of the parabolic shape of the rope considering the floor of the parabolic shape of

the rope considering the floor of the bridge as X-axis and the axis of the parabola as Y-axis. Find the height of that tower which supports the rope and is at a distance of 30 m from the centre of the road.

Watch Video Solution

90. Tangent is drawn at any point (x_1, y_1) on the parabola $y^2 = 4ax$. Now tangents are drawn from any point on this tangent to the circle $x^2 + y^2 = a^2$ such that all the chords of contact pass throught a fixed point (x_2, y_2) Prove that $4\left(\frac{x_1}{x_2}\right) + \left(\frac{y_1}{y_2}\right)^2 = 0.$

Watch Video Solution

91. If a chord PQ of the parabola $y^2 = 4ax$ subtends a right angle at the vertex, show that the locus of the point of intersection of the normals at P and Q is $y^2 = 16a(x - 6a)$.

Watch Video Solution

92. Find $\frac{dy}{dx}$ if $(3x + a)(x + 3a) = y^2$

Watch Video Solution

93. Find $\frac{dy}{dx}$ if $\frac{x^2}{a^2} + \frac{y^2}{b^2 - a^2} = 1$

Watch Video Solution

94. Two straight lines are perpendicular to each other. One of them touches the parabola $y^2 = 4a(x + a)$ and the other touches $y^2 = 4b(x + b)$. Their point of intersection lies on the line. (a) $x - a + b = 0$ (b) $x + a - b = 0$ (c) $x + a + b = 0$ (d) $x - a - b = 0$

Watch Video Solution

Jee Type Solved Examples

1. Match the Following

Column I	Column II
(A) If PQ is any focal chord of the parabola $y^2 = 32x$ and length of PQ can never be less than λ units, then λ is divisible by	(p) 2
(B) A tangent is drawn to the parabola $y^2 = 4x$ at the point 'P' whose abscissa lies in the interval $[1, 4]$. If maximum possible area of the triangle formed by the tangent at 'P', ordinate of the point 'P' and the X-axis is λ sq units, then λ is divisible by	(q) 3
(C) The normal at the ends of the latusrectum of the parabola $y^2 = 4x$ meet the parabola again at A and A'. If length $AA' = \lambda$ unit, then λ is divisible by	(r) 4
	(s) 6
	(t) 8

Watch Video Solution

Exercise For Session 1

1. The vertex of the parabola $y^2 + 6x - 2y + 13 = 0$ is

A. (-2,1)

B. (2,-1)

C. (1,1)

D. (1,-1)

Answer: A

Watch Video Solution

2. If the parabola $y^2 = 4ax$ passes through the point (3,2) then find the length of its latus rectum.

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. 1

D. $\frac{4}{3}$

Answer: D

Watch Video Solution

3. Find the value of P such that the vertex of $y = x^2 + 2px + 13$ is 4 units above the x-axis.

A. ± 2

B. 4

C. ± 3

D. 5

Answer: C

Watch Video Solution

4. The length of the latusrectum of the parbola whose focus is $(3, 3)$ and directrix $3x - 4y - 2 = 0$, is

A. a) 1

B. b) 2

C. c) 4

D. d) 8

Answer: B

Watch Video Solution

5. If the vertex and focus of a parabola are $(3, 3)$ and $(-3, 3)$ respectively, then its equation is

A. A. $x^2 - 6x + 24y - 63 = 0$

B. B. $x^2 - 6x + 24y - 81 = 0$

C. C. $y^2 - 6y + 24x - 63 = 0$

D. D. $y^2 - 6y - 24x + 81 = 0$

Answer: C

Watch Video Solution

6. If the vertex of the parabola $y = x^2 + x + c$ lies on x-axis, then the value of c, is

A. 4

B. -4

C. 16

D. -16

Answer: C

Watch Video Solution

7. The parabola having its focus at (3,2) and directrix along the Y-axis has its vertex at

A. $\left(\frac{3}{2}, 1\right)$

B. $\left(\frac{3}{2}, 2\right)$

C. $\left(\frac{3}{2}, \frac{1}{2}\right)$

D. $\left(\frac{3}{2}, -\frac{1}{2}\right)$

Answer: B

Watch Video Solution

8. about to only mathematics

A. y=0

B. x=1

C. y=-1

D. x=-1

Answer: C

Watch Video Solution

9. The equation of the latus retum of the parabola $x^2 + 4x + 2y = 0$ is

A. 3y-2=0

B. 3y+2=0

C. 2y-3=0

D. 2y+3=0

Answer: C

Watch Video Solution

10. The focus of the parabola $x^2 - 8x + 2y + 7 = 0$ is

A. $\left(0, -\frac{1}{2}\right)$

B. (4,4)

C. $\left(4, \frac{9}{2}\right)$

D. $\left(-4, -\frac{9}{2}\right)$

Answer: B

Watch Video Solution

11. The equation of the parabola with the focus (3,0) and directrix x+3=0 is

A. $y^2 = 2x$

B. $y^2 = 3x$

C. $y^2 = 6x$

D. $y^2 = 12x$

Answer: D

Watch Video Solution

12. Equation of the parabola whose axis is parallel to Y- axis and which passes through the point (1,0),(0,0)and (-2,4) , is

A. $2x^2 + 2y = 3y$

B. $2x^2 - 2x = 3y$

C. $2x^2 + 2x = y$

D. $2x^2 - 2x = y$

Answer: B

Watch Video Solution

13. Find the equation of the parabola whose focus is (5,3) and directrix is the line 3x-4y+1=0.

Watch Video Solution

14. about to only mathematics

Watch Video Solution

15. Find the vertex , focus, axis , directrix and latusrectum of the parabola $4y^2 + 12x - 20y + 67 = 0$.

Watch Video Solution

16. Find the name of the conic represented by $\sqrt{\left(\frac{x}{a}\right)} + \sqrt{\left(\frac{y}{b}\right)} = 1.$

Watch Video Solution

17. The curve described parametrically by $x = t^2 + t + 1$, and $y = t^2 - t + 1$ represents. (a) a pair of straight lines (b) an ellipse (c) a parabola (d) a hyperbola

Watch Video Solution

18. Prove that the equation of the parabola whose vertex and focus are on the X-axis at a distance a and a'from the origin respectively is $y^2 = 4(a' - a)(x - a)$

Watch Video Solution

19. Find the equatin to the parabola whose axis is parallel to the y-xis and which passes through the point $(0, 4), (1.9), \text{ and } (-2, 6)$ and determine its latus rectum.

Watch Video Solution

20. The equation $ax^2 + 4xy + y^2 + ax + 3y + 2 = 0$ represents a parabola. Find the value of a.

Watch Video Solution

Exercise For Session 2

1. If $2x + y + \lambda = 0$ is a normal to the parabola $y^2 = -8x$, then λ is (a)12 (b) -12 (c) 24 (d) -24

A. -24

B. -16

C. -8

D. 24

Answer: D

Watch Video Solution

2. If a normal chord subtends a right at the vertex of the parabola `y^(2)=4ax,then find its inclination to the axis.

A. $\frac{1}{\sqrt{2}}$

B. $\sqrt{2}$

C. $-\frac{1}{\sqrt{2}}$

D. $-\sqrt{2}$

Answer: B::D

Watch Video Solution

3. The common tangent to the parabola $y^2 = 4ax$ and $x^2 = 4ay$ is

A. (a) x+y+a=0

B. (b) x+y-a=0

C. (c) x-y+a=0

D. (d) x-y-a=0

Answer: A

Watch Video Solution

4. The circle $x^2 + y^2 + 4\lambda x = 0$ which $\lambda \in R$ touches the parabola $y^2 = 8x$. The value of λ is given by

Watch Video Solution

5. If the normals at two points P and Q of a parabola $y^2 = 4ax$ intersect at a third point R on the curve, then the product of ordinates of P and Q is

A. $4a^2$

B. $2a^2$

C. $-4a^2$

D. $8a^2$

Answer: D

Watch Video Solution

6. The normals at three points P, Q, R of the parabola $y^2 = 4ax$ meet in (h, k) The centroid of triangle PQR lies on (A)x=0(B)y=0(C)x=-a(D)y=a`

A. x=0

B. y=0

C. x=-a

D. y=a

Answer: D

Watch Video Solution

7. The set of points on the axis of the parabola $y^2 - 4x - 2y + 5 = 0$ from which all the three normals to

the parabola are real , is

A. $\lambda, 0), x > 1$

B. $(\lambda, 1), \lambda > 3$

C. $(\lambda, 2), \lambda > 6$

D. $(\lambda, 3), \lambda > 8$

Answer: B

Watch Video Solution

8. Prove that any three tangents to a parabola whose slopes are in harmonic progression enclose a triangle of constant area.

Watch Video Solution

9. prove that the locus of the point of intersection of the tangents at the extremities of any chord of the parabola $y^2 = 4ax$ which subtends a right angle at the vertes is $x + 4a = 0$.

Watch Video Solution

10. Find the equation of the normal to the parabola $y^2 = 4x$ which is

parallel to the line y=2x-5.

Watch Video Solution

11. Find the equation of the normal to the parabola $y^2 = 4x$ which is

perpendicular to the line 2x+6y+5=0.

Watch Video Solution

12. The ordinates of points P and Q on the parabola $y^2 = 12x$ are in the ration 1:2 . Find the locus of the point of intersection of the normals to the parabola at P and Q.

Watch Video Solution

13. The normals at P, Q, R on the parabola $y^2 = 4ax$ meet in a point on the line $y = c$. Prove that the sides of the triangle PQR touch the parabola $x^2 = 2cy$.

Watch Video Solution

14. Three normals are drawn from $(2\lambda, 0)$ to the parabola $y^2 = 4x$ .Show that λ must be less than 1. One normal is always the X-axis. Find λ for which the other two normals are perpendicular to each other.

Watch Video Solution

15. If m_1, m_2 are the slopes of the two tangents that are drawn from (2,3) to the parabola $y^2 = 4x$, then the value of $\frac{1}{m_1} + \frac{1}{m_2}$ is

A. -3

B. 3

C. $\frac{2}{3}$

D. $\frac{3}{2}$

Answer: B

Watch Video Solution

16. Find the angle between the tangents drawn from the origin to the parabolas $y^2 = 4a(x - a)$

A. 90°

B. 30°

C. $\tan^{-1}\left(\frac{1}{2}\right)$

D. 45°

Answer: A

Watch Video Solution

17. If (a, b) is the midpoint of a chord passing through the vertex of the parabola $y^2 = 4x$, then (a)$a = 2b$ (b) $a^2 = 2b$ (c)$a^2 = 2b$ (d) $2a = b^2$

A. a=2b

B. 2a=b

C. $a^2 = 2b$

D. $2a = b^2$

Answer: D

Watch Video Solution

18. The diameter of the parabola $y^2 = 6x$ corresponding to the system of parallel chords 3x-y+c=0 is

A. (a)y-1=0

B. (b)y-2=0

C. (c)y+1=0

D. (d)y+2=0

Answer: A

Watch Video Solution

19. Tangents are drawn from the point (-1, 2) to the parabola $y^2 = 4x$ The area of the triangle for tangents and their chord of contact is

A. 8

B. $8\sqrt{3}$

C. $8\sqrt{2}$

D. None of these

Answer: C

Watch Video Solution

20. for parabola $x^2 + y^2 + 2xy - 6x - 2y + 3 = 0$, the focus is.

A. (1,-1)

B. (1,1)

C. (3,1)

D. None of these

Answer: C

Watch Video Solution

21. Find the locus of the middle points of the chords of the parabola $y^2 = 4ax$ which subtend a right angle at the vertex of the parabola.

A. $y^2 - 2ax + 8a^2 = 0$

B. $y^2 = a(x - 4a)$

C. $y^2 = 4a(x - 4a)$

D. $y^2 + 3ax + 4a^2 = 0$

Answer: A

Watch Video Solution

22. A ray of light moving parallel to the x-axis gets reflected form a parabolic mirror whose equation is $(y-2)^2 = 4(x+1)$. Find the point on the axis of the parabola through which the ray must pass after reflection.

A. (-2,0)

B. (-1,2)

C. (0,2)

D. (2,0)

Answer: C

Watch Video Solution

23. The locus of the point of intersection of the tangents to the parabola $y^2 = 4ax$ which include an angle α is

Watch Video Solution

24. about to only mathematics

Watch Video Solution

25. Tangents are drawn from the point (-1, 2) to the parabola $y^2 = 4x$ The area of the triangle for tangents and their chord of contact is

Watch Video Solution

Exercise Single Option Correct Type Questions

1. A common tangent is drawn to the circle $x^2 + y^2 = a^2$ and the parabola $y^2 = 4bx$. If the angle which his tangent makes with the axis of x is $\frac{\pi}{4}$, then the relationship between a and b (a,b $>$ 0)

A. A. $b = \sqrt{2}a$

B. B. $a = b\sqrt{2}$

C. C. c=2a

D. D. a=2c

Answer: A

Watch Video Solution

2. The equation of the parabola whose vertex and focus lie on the axis of x at distances a and a_1 from the origin, respectively, is (a) $y^2 - 4(a_1 - a)x$ (b) $y^2 - 4(a_1 - a)(x - a)$ (c) $y^2 - 4(a_1 - a)(x - a)$ (d) *none*

A. $y^2 = 4(a_1 - a)x$

B. $y^2 = 4(a_1 - a)(x - a)$

C. $y^2 = 4(a_1 - a)(x - a_1)$

D. $y^2 = 4aa_1x$

Answer: B

Watch Video Solution

3. If parabolas $y^2 = \lambda x$ and $25\left[(x-3)^2 + (y+2)^2\right] = (3x - 4y - 2)^2$ are equal, then the value of λ is (a) 9 (b) 3 (c) 7 (d) 6

A. 3

B. 6

C. 7

D. 9

Answer: B

Watch Video Solution

4. ABCD and EFGC are squares and the curve $y = k\sqrt{x}$ passes through the origin D and the points B and F.The ratio of $\frac{FG}{BC}$

is:

A. A. $\frac{\sqrt{3}+1}{4}$

B. B. $\frac{\sqrt{3}+1}{2}$

C. C. $\frac{\sqrt{5}+1}{4}$

D. D. $\frac{\sqrt{5}+1}{2}$

Answer: D

Watch Video Solution

5. Find $\frac{dy}{dx}$ if $y^2 = x$

Watch Video Solution

6. The vertex of the parabola whose parametric equation is $x = t^2 - t + 1, y = t^2 + t + 1, t \in R$, is

A. (1,1)

B. (2,2)

C. (3,3)

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

Answer: A

Watch Video Solution

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

A. $p > 0$

B. $p < 0$

C. $p > 1$

D. $p > 2$

Answer: A

Watch Video Solution

8. If $a \neq 0$ and the line $2bx + 3cy + 4d = 0$ passes through the points of intersection of the parabolas $y^2 = 4ax$ and $x^2 = 4ay$, then $d^2 + (2b + 3c)^2 = 0$ $d^2 + (3b + 2c)^2 = 0$ $d^2 + (2b - 3c)^2 = 0$ none of these

A. $d^2 + (2b + 3c)^2 = 0$

B. $d^2 + (3b + 2c)^2 = a^2$

C. $d^2 + (2b - 3c)^2 = 0$

D. $d^2 + (2b + 3c)^2 = a^2$

Answer: A

Watch Video Solution

9. A parabola $y = ax^2 + bx + c$ crosses the x-axis at $(\alpha, 0)(\beta, 0)$ both to the right of the origin. A circle also passes through these two points. The length of a tangent from the origin to the circle is: (a) $\sqrt{\frac{bc}{a}}$ (b) ac^2 (c) b/a (d) $\sqrt{\frac{c}{a}}$

A. $\sqrt{\frac{bc}{a}}$

B. ac^2

C. $\frac{b}{a}$

D. $\sqrt{\frac{c}{a}}$

Answer: D

Watch Video Solution

10. Two mutually perpendicular tangents of the parabola $y^2 = 4ax$ meet the axis at P_1 and P_2. If S is the focal of the parabola, Then $\frac{1}{SP_1} + \frac{1}{SP_2}$ is equal to

A. $\frac{1}{4a}$

B. $\frac{1}{a}$

C. $\frac{2}{a}$

D. $\frac{4}{a}$

Answer: B

Watch Video Solution

11. If the normals to the parabola $y^2 = 4ax$ at P meets the curve again at Q and if PQ and the normal at Q make angle α andβ , respectively, with the x-axis, then $tan\alpha(\tan\alpha + \tan\beta)$ has the value equal to 0 (b) -2 (c) $-\frac{1}{2}$ (d) -1

A. -2

B. -1

C. $-\frac{1}{2}$

D. 0

Answer: A

Watch Video Solution

12. The normal to the parabola $y^2 = 4ax$ at three points P,Q and R meet at A. If S is the focus, then prove that $SP \cdot SR = aSA^2$.

A. $(SA)^2$

B. $(SA)^3$

C. $a(SA)^2$

D. $a(SA)^3$

Answer: C

Watch Video Solution

13. about to only mathematics

A. $2a\sqrt{27}$

B. 9a

C. $a\sqrt{54}$

D. 18a

Answer: A

Watch Video Solution

14. The largest value of a for which the circle $x^2 + y^2 = a^2$ falls totally in the interior of the parabola $y^2 = 4(x + 4)$ is $4\sqrt{3}$ (b) 4 (c) $4\frac{\sqrt{6}}{7}$ (d) $2\sqrt{3}$

A. $4\sqrt{3}$

B. 4

C. $\frac{4\sqrt{6}}{7}$

D. $2\sqrt{3}$

Answer: D

Watch Video Solution

15. From a point $(\sin\theta, \cos\theta)$, if three normals can be drawn to the parabola $y^2 = 4ax$ then the value of a is

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

B. $\left[-\frac{1}{2}, 0\right)$

C. $\left[\frac{1}{2}, 1\right]$

D. $\left(-\frac{1}{2}, 0\right) \cup \left(0, \frac{1}{2}\right)$

Answer: D

Watch Video Solution

16. If two different tangents of $y^2 = 4x$ are the normals to $x^2 = 4by$, then $|b| > \frac{1}{2\sqrt{2}}$ (b) $|b| < \frac{1}{2\sqrt{2}}$ $|b| > \frac{1}{\sqrt{2}}$ (d) $|b| < \frac{1}{\sqrt{2}}$

A. $|b| < \frac{1}{2\sqrt{2}}$

B. $|b| < \frac{1}{\sqrt{2}}$

C. $|b| > \frac{1}{2\sqrt{2}}$

D. $|b| > \frac{1}{\sqrt{2}}$

Answer: A

Watch Video Solution

17. The shortest distance between the parabolas $2y^2 = 2x - 1$ and $2x^2 = 2y - 1$ is $2\sqrt{2}$ (b) $\frac{1}{2}\sqrt{2}$ (c) 4 (d) $\sqrt{\frac{36}{5}}$

A. $\frac{1}{2\sqrt{2}}$

B. $\frac{1}{2}$

C. $2\sqrt{2}$

D. 4

Answer: A

Watch Video Solution

18. Normals at two points $(x_1 y_1) and (x_2, y_2)$ of the parabola $y^2 = 4x$ meet again on the parabola, where $x_1 + x_2 = 4$. Then $|y_1 + y_2|$ is equal to $\sqrt{2}$ (b) $2\sqrt{2}$ (c) $4\sqrt{2}$ (d) none of these

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $4\sqrt{2}$

D. $8\sqrt{2}$

Answer: C

Watch Video Solution

19. A line is drawn form $A(-2, 0)$ to intersect the curve $y^2 = 4x$ at $PandQ$ in the first quadrant such that $\frac{1}{AP} + \frac{1}{AQ} < \frac{1}{4}$. Then the slope of the line is always.

$> \sqrt{3}$ (b) $< \frac{1}{\sqrt{3}}$ $> \sqrt{2}$ (d) $> \frac{1}{\sqrt{3}}$

A. $< \frac{1}{\sqrt{3}}$

B. $> \frac{1}{\sqrt{3}}$

C. $> \sqrt{2}$

D. $> \sqrt{3}$

Answer: D

Watch Video Solution

20. An equilateral triangle SAB is inscribed in the parabola $y^2 = 4ax$ having its focus at S. If chord AB lies towards the left of S, then the side length of the triangle is

A. $a - \left(2 - \sqrt{3}\right)$

B. $2a\left(2 - \sqrt{3}\right)$

C. $4a\left(2 - \sqrt{3}\right)$

D. $8a\left(2 - \sqrt{3}\right)$

Answer: C

Watch Video Solution

21. C is the center of the circle with center (0, 1) and radius unity. P is the parabola $y = ax^2$. The set of values of a for

which they meet at a point other than the origin is $a > 0$ (b) $a \in \left(0, \frac{1}{2}\right)$ $\left(\frac{1}{4}, \frac{1}{2}\right)$ (d) $\left(\frac{1}{2}, \infty\right)$

A. $(0, \infty)$

B. $\left(0, \frac{1}{2}\right)$

C. $\left(\frac{1}{4}, \frac{1}{2}\right)$

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

Answer: D

Watch Video Solution

22. Let S be the focus of $y^2 = 4x$ and a point P be moving on the curve such that its abscissa is increasing at the rate of 4 units/s. Then the rate of increase of the projection of SP

on $x + y = 1$ when P is at (4, 4) is $\sqrt{2}$ (b) -1 (c) $-\sqrt{2}$ (d) $-\frac{3}{\sqrt{2}}$

A. $-\sqrt{2}$

B. $-\frac{3}{\sqrt{2}}$

C. -1

D. $\sqrt{2}$

Answer: A

Watch Video Solution

23. If P be a point on the parabola $y^2 = 3(2x - 3)$ and M is the foot of perpendicular drawn from the point P on the directrix of the parabola, then find length of each sides of an

equilateral triangle SMP(where S is the focus of the parabola).

A. 2

B. 4

C. 6

D. 8

Answer: C

Watch Video Solution

24. Consider the parabola $y^2 = 4x$. Let $A \equiv (4, -4)$ and $B \equiv (9, 6)$ be two fixed points on the parabola. Let C be a moving point on the parabola between $AandB$ such that the

area of the triangle ABC is maximum. Then the coordinates of C are (a) $\left(\frac{1}{4}, 1\right)$ (b) $(4, 4)$ (c) $\left(3, \frac{2}{\sqrt{3}}\right)$ (d) $\left(3, -2\sqrt{3}\right)$

A. $\left(\frac{1}{4}, 1\right)$

B. $\left(3, -2\sqrt{3}\right)$

C. $\left(3, 2\sqrt{3}\right)$

D. (4,4)

Answer: A

Watch Video Solution

25. Through the vertex O of the parabola $y^2 = 4ax$, two chords $OPandOQ$ are drawn and the circles on OP and OQ as diameters intersect at R. If θ_1, θ_2 , and φ are the angles

made with the axis by the tangents at P and Q on the parabola and by OR, then value of $\cot\theta_1 + \cot\theta_2$ is $-2\tan\varphi$ (b) $-2\tan(\pi-\varphi)$ 0 (d) $2\cot\varphi$

A. $-2\tan\phi$

B. $2\tan\phi$

C. 0

D. $2\cot\phi$

Answer: A

Watch Video Solution

26. AB is a double ordinate of the parabola $y^2 = 4ax$. Tangents drawn to the parabola at $AandB$ meet the y-axis at A_1andB_1 , respectively. If the area of trapezium $\forall_1 B_1 B$ is

equal to $12a^2$, then the angle subtended by A_1B_1 at the focus of the parabola is equal to $2\tan^{-1}(3)$ (b) $\tan^{-1}(3)$ $2\tan^{-1}(2)$ (d) $\tan^{-1}(2)$

A. $\tan^{-1}2$

B. $\tan^{-1}3$

C. $2\tan^{-1}2$

D. $2\tan^{-1}3$

Answer: C

Watch Video Solution

27. If the fourth term in the expansion of $\left(ax+\frac{1}{x}\right)is\frac{5}{2}$, then find the values of a and n.

A. q=p

B. $q > p$

C. $q < p$

D. pq=1

Answer: D

Watch Video Solution

28. The set of points on the axis of the parabola $y^2 - 4x - 2y + 5 = 0$ find the slope of normal to the curve at (0,0)

Watch Video Solution

29. The tangent to the parabola $y = x^2$ has been drawn so that the abscissa x_0 of the point of tangency belongs to the interval [1,2]. Find x_0 for which the triangle bounded by the tangent, the axis of ordinates, and the straight line $y = x02$ has the greatest area.

A. 0

B. 1

C. 2

D. 3

Answer: C

Watch Video Solution

30. if $y = 4x + 3$ is parallel to a tangent to the parabola $y^2 = 12x$, then its distance from the normal parallel to the given line is

A. $\frac{213}{\sqrt{17}}$

B. $\frac{219}{\sqrt{17}}$

C. $\frac{211}{\sqrt{17}}$

D. $\frac{210}{\sqrt{17}}$

Answer: D

Watch Video Solution

Exercise More Than One Correct Option Type Questions

1. Equation of the common tangent of a circle $x^2 + y^2 = 50$ and the parabola $y^2 = 40x$ can be

A. x+y-10=0

B. x-y+10=0

C. x+y+10=0

D. x-y-10=0

Answer: B::C

Watch Video Solution

2. about to only mathematics

A. (16,8)

B. (16,-8)

C. (-16,8)

D. (-16,-8)

Answer: A::B

Watch Video Solution

3. Let $y^2 = 4ax$ be a parabola and $x^2 + y^2 + 2bx = 0$ be a circle. If parabola and circle touch each externally then:

A. $a > 0, b < 0$

B. $a > 0, b > 0$

C. $a < 0, b > 0$

D. $a < 0, b < 0$

Answer: B::D

Watch Video Solution

4. Tangent is drawn at any point (x_1, y_1) other than the vertex on the parabola $y^2 = 4ax$. If tangents are drawn from any point on this tangent to the circle $x^2 + y^2 = a^2$ such that all the chords of contact pass through a fixed point (x_2, y_2), then (a) x_1, a, x_2 in GP (b) $\frac{y_1}{2}, a, y_2$ are in GP (c) $-4, \frac{y_1}{y_2}, \frac{x_1}{x_2}$ are in GP (d) $x_1x_2 + y_1y_2 = a^2$

A. x_1, a, x_2 are in GP

B. $\frac{y_1}{2}, a, y_2$ are in GP

C. $-4, \frac{y_1}{y_2}, \frac{x_1}{x_2}$ are in GP

D. $x_1x_2 + y_1y_2 = a^2$

Answer: B::C::D

Watch Video Solution

5. Let P , Q and R are three co-normal points on the parabola $y^2 = 4ax$. Then the correct statement(s) is /at

A. algebraic sum of the slopes of the normals at P,Q and R vanishes

B. algebraic sum of the ordinates of the points P,Q and R vanishes

C. centeroid of the traingle PQR lies on the axis of the parabola

D. Circle cicrcumscribing the traingle PQR passes through the vertex of the parabola.

Answer: A::B::C::D

Watch Video Solution

6. Let P be a point whose coordinates differ by unity and the point does not lie on any of the axes of reference. If the parabola $y^2 = 4x + 1$ passes through P, then the ordinate of P may be 3 (b) -1 (c) 5 (d) 1

A. 3

B. -1

C. 5

D. 1

Answer: A::C

Watch Video Solution

7. If a point P on y^2x, the foot of the perpendicular from P on the directrix and the focus form an equilateral traingle , then the coordinates of P may be

A. $(3, -2\sqrt{3})$

B. $(-3, 2\sqrt{3})$

C. $(3, 2\sqrt{3})$

D. $(-3, -2\sqrt{3})$

Answer: A::C

Watch Video Solution

8. The locus of foot of the perpendiculars drawn from the focus on a variable tangent to the parabola $y^2 = 4ax$ is

A. the directrix

B. the tangent at the vertex

C. x=a

D. x=0

Answer: B::D

Watch Video Solution

9. The extremities of latus rectum of a parabola are (1,1) and (1,-1). Then the equation of the parabola can be

A. $y^2 = 2x - 1$

B. $y^2 = 1 - 2x$

C. $y^2 = 2x - 3$

D. $y^2 = 2x - 4$

Answer: A::C

Watch Video Solution

10. If from the vertex of a parabola $y^2 = 4x$ a pair of chords be drawn at right angles to one another andwith these

chords as adjacent sides a rectangle be made, then the locus of the further end of the rectangle is

A. an equal parabola

B. a parabola with focus at (8a,0)

C. a parabola with directrix as x-7a=0

D. not a parabola

Answer: A::C

Watch Video Solution

11. If two chords drawn from the point $A(4, 4)$ to the parabola $x^2 = 4y$ are bisected by the line $y = mx$, the interval in which m lies is $(-2\sqrt{2}, 2\sqrt{2})$

$(-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)$

$(-\infty, -2\sqrt{2}-2) \cup (2\sqrt{2}-2, \infty)$ none of these

A. $m \in (-\infty, -\sqrt{3})$

B. $m \in (-\infty, -\sqrt{3}-1)$

C. $m \in (\sqrt{3}, \infty)$

D. $m \in (\sqrt{3}-1, \infty)$

Answer: B::C::D

Watch Video Solution

12. The set of points on the axis of the parabola $(y-2)^2 = 4\left(x - \frac{1}{2}\right)$ from which three distinct normals can be drawn to the parabola are

A. (3,2)

B. (1,2)

C. (4,2)

D. (5,2)

Answer: A::C::D

Watch Video Solution

13. Three normals are drawn from the point $(14, 7)$ to the curve $y^2 - 16x - 8y = 0$. Find the coordinates of the feet of the normals.

A. (3,-4)

B. (8,16)

C. (0,0)

D. (2,2)

Answer: A::B::C

Watch Video Solution

14. A quadrilateral is inscribed in a parabola. Then the quadrilateral may be cyclic diagonals of the quadrilateral may be equal allpossible pairs of adjacent side may be perpendicular none of these

A. the quadrilateral may be cyclic

B. diagonals of the quadrilateral may be equal

C. all possible pairs of adjacent sides may be perpendicular

D. None of the above

Answer: A::B

Watch Video Solution

Exercise Passage Based Questions

1. Consider a parabola P touches coordinate axes at (4,0) and (0,3).

if focus of parabola P is (a,b) then the value of b-a is

A. $\frac{1}{25}$

B. $\frac{3}{25}$

C. $\frac{4}{25}$

D. $\frac{12}{25}$

Answer: D

Watch Video Solution

2. Consider a parabola P touches coordinate axes at (4,0) and (0,3).

Length of latus rectum of parabola P is

A. `

B.

C.

D.

Answer: D

Watch Video Solution

3. Consider a parabola P touches coordinate axes at (4,0) and (0,3).

Equation of directrix of parabola P is

A. $4x+3y=0$

B. $3x+4y=12$

C. $3x+4y=0$

D. $4x+3y=12$

Answer: C

Watch Video Solution

4. Let C be the locus of the circumcentre of a variable traingle having sides Y-axis ,y=2 and ax+by=1, where (a,b) lies on the parabola $y^2 = 4\lambda x$.

For $\lambda = 2$, the product of coordinates of the vertex of the curve C is

A. -8

B. -6

C. 6

D. 8

Answer: B

Watch Video Solution

5. Find $\frac{dy}{dx}$ if $y^2 = 4\lambda x$

Watch Video Solution

6. The locus of the circumcenter of a variable triangle having sides the y-axis, y=2, and lx+my=1, where (1,m) lies on the parabola $y^2 = 4x$, is a curve C.

The curve C is symmetric about the line

A. $x = -\frac{3}{2}$

B. $y = -\frac{3}{2}$

C. $x = \frac{3}{2}$

D. $y = \frac{3}{2}$

Answer: D

Watch Video Solution

7. Consider a parabola $x^2 - 4xy + 4y^2 - 32x + 4y + 16 = 0$

.

The focus of the parabola (P) is

A. (2,1)

B. (-2,1)

C. (-2,-1)

D. (2,-1)

Answer: D

Watch Video Solution

8. Consider a parabola $x^2 - 4xy + 4y^2 - 32x + 4y + 16 = 0$

.

The focus of the parabola (P) is

A. $\frac{3}{\sqrt{5}}$

B. $\frac{6}{\sqrt{5}}$

C. $\frac{12}{\sqrt{5}}$

D. $\frac{24}{\sqrt{5}}$

Answer: C

Watch Video Solution

9. Consider a parabola $x^2 - 4xy + 4y^2 - 32x + 4y + 16 = 0$

.

The focus of the parabola (P) is

A. x-2y-4=0

B. 2x+y-3=0

C. x-2y+4=0

D. 2x+y+3=0

Answer: D

Watch Video Solution

10. If l and m are variable real number such that $5l^2 + 6m^2 - 4lm + 3l = 0$, then the variable line lx+my=1

always touches a fixed parabola, whose axes is parallel to the x-axis.

The directrix of the parabola is

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

11. IF l and m are variable real numbers such that $5l^2 - 4lm + 6m^2 + 3l = 0$, then the variable line lx+my=1 always touches a fixed parabola, whose axis is parallel to the

X-axis.

If (c,d) is the focus of the parabola , then the value of $2^{|d-c|}$ is

A. 1

B. 2

C. 4

D. 8

Answer: B

Watch Video Solution

12. If l and m are variable real numbers such that $5l^2 - 4lm + 6m^2 + 3l = 0$, then the variable line lx+my=1 always touches a fixed parabola, whose axis is parallel to the

X-axis.

If ex+f=0 is directrix of the parabola and e,f are prime numbers , then the value of $|e - f|$ is

A. 2

B. 4

C. 6

D. 8

Answer: D

Watch Video Solution

13. Find the slope of tangent to the curve if equation of the curve is $y^2 = 4x$ at (5, 6)

Watch Video Solution

14. Find the slope of normal to the curve if equation of the curve is $y^2 = 4x$ at (4, 5)

Watch Video Solution

15. Find $\frac{dy}{dx}$ if $y^2 = 10x$

Watch Video Solution

16. Tangent to the parabola $y = x^2 + ax + 1$ at the point of intersection of the y-axis also touches the circle $x^2 + y^2 = r^2$. Also, no point of the parabola is below the x-

axis.

The radius of circle when a attains its maximum value is

A. 1

B. 3

C. 5

D. 7

Answer: A

Watch Video Solution

17. Tangent to the parabola $y = x^2 + ax + 1$ at the point of intersection of the y-axis also touches the circle $x^2 + y^2 = r^2$. Also, no point of the parabola is below the x-

axis.

The radius of circle when a attains its maximum value is

A. 1/(rt.10)

B. 1/(rt.5)

C. 1

D. Rt. 5

Answer: B

Watch Video Solution

18. Tangent to the parabola $y = x^2 + ax + 1$ at the point of intersection of the y-axis also touches the circle $x^2 + y^2 = r^2$. Also, no point of the parabola is below the x-axis.

The minimum area bounded by the tangent and the coordinate axes is

A. 1

B. 2

C. 4

D. 8

Answer: B

Watch Video Solution

19. Find the slope of tangent to the curve if equation of the curve is $x^2 + xy + y^2 - 2x - 2y + 1 = 0$ at (0,0)

Watch Video Solution

20. A parabola (P) touches the conic $x^2 + xy + y^2 - 2x - 2y + 1 = 0$ at the points when it is cut by the line x+y+1=0.

The length of latusrectum of parabola (P) is

A. $\sqrt{2}$

B. $3\sqrt{2}$

C. $5\sqrt{2}$

D. $7\sqrt{2}$

Answer: D

Watch Video Solution

21. A parabola (P) touches the conic $x^2 + xy + y^2 - 2x - 2y + 1 = 0$ at the points when it is cut by the line x+y+1=0.

If (a,b) is the vertex of the parabola (P), then the value of $|a - b|$ is

A. 0

B. $\frac{1}{2}$

C. 1

D. $\frac{3}{2}$

Answer: A

Watch Video Solution

22. y=3x is tangent to the parabola $2y = ax^2 + b$. The minimum value of a+b is

A. 2

B. 4

C. 6

D. 8

Answer: C

Watch Video Solution

23. y=3x is tangent to the parabola $2y = ax^2 + ab$.

If (2,6) is the point of contact , then the value of 2a is

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

24. y=3x is tangent to the parabola $2y = ax^2 + ab.$

If b=36,then the point of contact is

A. (1,3)

B. (2,6)

C. (3,9)

D. (6,18)

Answer: D

Watch Video Solution

Exercise Single Integer Answer Type Questions

1. Two tangent are drawn from the point $(-2, -1)$ to parabola $y^2 = 4x$. if α is the angle between these tangents, then find the value of $\tan\alpha$.

Watch Video Solution

2. The tangents and normals are drawn at the extremites of the latusrectum of the parabola $y^2 = 4x$. The area of quadrilateral so formed is λsq units, the value of λ is

Watch Video Solution

3. Three normals are drawn from the point (a,0) to the parabola $y^2 = x$. One normal is the X-axis . If other two normals are perpendicular to each other , then the value of 4a is

Watch Video Solution

4. AB is a chord of the parabola $y^2 = 4ax$ with vertex $A\dot{B}C$ is drawn perpendicular to AB meeting the axis at C. The

projection of BC on the axis of the parabola is a (b) $2a$ (c) $4a$ (d) $8a$

Watch Video Solution

5. The parabolas $y = x^2 - 9$ and $y = \lambda x^2$ intersect at points A and B. If length of AB is equal to 2a and if $\lambda a^2 + \mu = a^2$, then the value of μ is

Watch Video Solution

6. Let n be the number of integral points lying inside the parabola $y^2 = 8x$ and circle $x^2 + y^2 = 16$, then the sum of the digits of number n is

Watch Video Solution

7. Radius of the largest circle which passes through the focus of the parabola $y^2 = 4x$ and contained in it, is

Watch Video Solution

8. If the circle $(x-6)^2 + y^2 = r^2$ and the parabola $y^2 = 4x$ have maximum number of common chords, then the least integral value of r is _____ .

Watch Video Solution

9. The slope of line which belongs to family (1+ l) x + (l-1)y + 2(1-l) = 0 and makes shortest intercept on $x^2 = 4y - 4$

Watch Video Solution

Parabola Exercise 5

1. Find $\frac{dy}{dx}$ if $x = y^2 - 6y + 11$

Watch Video Solution

2. Find $\frac{dy}{dx}$ if $x^2 - ay + 3 = 0$

Watch Video Solution

3. Match the Following

	Column I		Column II
(A)	The common chord of the circle $x^2 + y^2 = 5$ and the parabola $6y = 5x^2 + 7x$ will passes through the point (s)	(p)	$(1, 2)$
(B)	Tangents are drawn from point $(2, 3)$ to the parabola $y^2 = 4x$. Then, the points of contact are	(q)	$(4, 4)$
(C)	From a point P on the circle $x^2 + y^2 = 5$, the equation of chord of contact to the parabola $y^2 = 4x$ is $y = 2(x - 2)$. Then, the coordinates of point P will be	(r)	$(-2, 1)$
(D)	$P(4, -4)$ and Q are points on the parabola $y^2 = 4x$ such that the area of ΔPOQ is 6 sq units, where O is the vertex. Then, the coordinates of Q may be	(s)	$(9, -6)$

Watch Video Solution

Exercise Statement I And Ii Type Questions

1. Statement I the equation of the common tangent to the parabolas $y^2 = 4x$ and $x^2 = 4y$ is $x + y + 1 = 0$.

Statement II Both the parabolas are reflected to each other about the line $y = x$.

A. Statement I is true, Statement II is true , Statement II is a correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false,Statement II is true.

Answer: A

Watch Video Solution

2. Statement I two perpendicular normals can be drawn from the point $\left(\frac{5}{2}, -2\right)$ to the parabola $(y+1)^2 = 2(x-1)$.

Statement II two perpendicular normals can be drawn from the point (3a,0) to the parabola $y^2 = 4ax$.

A. Statement I is true, Statement II is true , Statement II is a correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false,Statement II is true.

Answer: A

Watch Video Solution

3. Statement I The line $y = mx + \frac{a}{m}$ is tangent to the parabola $y^2 = 4ax$ for all values of m.

Statement II A straight line y=mx+c intersects the parabola $y^2 = 4ax$ one point is a tangent line.

Watch Video Solution

4. Statement I: The conic $\sqrt{a}x + \sqrt{b}y = 1$ represents a parabola.

Statement II: Conic $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a parabola if $h^2 = ab$.

A. (a) Statement I is true, Statement II is true and Statement II is the correct explanation for Statement I.

B. (b) Statement I is true and Statement II is true but Statement II is not the correct explanation for Statement I.

C. (c) Statement I is false, Statement II is false.

D. (d) Statement I is false, Statement II is true.

Answer: C

Watch Video Solution

5. Statement I: The lines from the vertex to the two extremities of a focal chord of the parabola $y^2 = 4ax$ are perpendicular to each other.

Statement II: If the extremities of focal chord of a parabola are $\left(at_1^2, 2at_1\right)$ and $\left(at_2^2, 2at_2\right)$, then $t_1 t_2 = -1$.

A. (a) Statement I is true, Statement II is true and Statement II is the correct explanation for Statement I.

B. (b) Statement I is true and Statement II is true but Statement II is not the correct explanation for Statement I.

C. (c) Statement I is true, Statement II is false.

D. (d) Statement I is false, Statement II is true.

Answer: D

Watch Video Solution

6. Statement 1: The length of focal chord of a parabola $y^2 = 8x$ mkaing on angle of 60^0 with the x-axis is 32.

Statement 2: The length of focal chord of a parabola $y^2 = 4ax$ making an angle with the x-axis is $4a \cos ec^2 \alpha$

A. Statement I is true, Statement II is true , Statement II is a correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false,Statement II is true.

Answer: C

Watch Video Solution

7. Statement I Straight line $x + y = k$ touch the parabola $y = x - x^2$, if k=1.

Statement II Discriminant of $(x - 1)^2 = x - x^2$ is zero.

A. Statement I is true, Statement II is true , Statement II is a correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not a correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false,Statement II is true.

Answer: C

Watch Video Solution

Exercise Subjective Type Questions

1. If a tangent to the parabola $y^2 = 4ax$ meets the axis of the parabola in T and the tangent at the vertex A in Y, and the rectangle $TAYG$ is completed, show that the locus of G is $y^2 + ax = 0$.

Watch Video Solution

2. If incident from point $(-1, 2)$ parallel to the axis of the parabola $y^2 = 4x$ strike the parabola, then find the equation of the reflected ray.

Watch Video Solution

3. Prove that the normal chord to a parabola at the point whose ordinate is equal to the abscissa subtends a right angle at the focus.

Watch Video Solution

4. about to only mathematics

Watch Video Solution

5. Find the slope of tangent to the curve if equation of the curve is $y^2 = 4ax$ at (0,0)

Watch Video Solution

6. Through the vertex O of the parabola $y^2 = 4ax$, two chords $OPandOQ$ are drawn and the circles on OP and OQ as diameters intersect at R. If θ_1, θ_2 , and φ are the angles made with the axis by the tangents at P and Q on the parabola and by OR, then value of $\cot\theta_1 + \cot\theta_2$ is $-2\tan\varphi$ (b) $-2\tan(\pi - \varphi)$ 0 (d) $2\cot\varphi$

Watch Video Solution

7. about to only mathematics

Watch Video Solution

8. Find the slope of normal to the curve if equation of the curve is $y^2 = 4ax$ at (0 , 0)

Watch Video Solution

9. If equation of the curve is $y^2 = 4x$ then find the slope of normal to the curve

Watch Video Solution

10. The normals at P,Q and R are concurrent and PQ meets the diameter through R on the directrix x=-a . Prove that PQ touches [or PQ enveleopes] the parabola $y^2 + 16a(x + a) = 0.$

Watch Video Solution

11. If the normals to the parabola $y^2 = 4ax$ at three points $P, Q, andR$ meet at $A, andS$ is the focus, then $SP\dot{S}q\dot{S}R$ is equal to a^2SA (b) SA^3 (c) aSA^2 (d) none of these

Watch Video Solution

12. Find slope of tangent to the curve $x^2 + y^2 = \frac{a^2}{2}$

Watch Video Solution

13. Prove that any three tangents to a parabola whose slopes are in harmonic progression enclose slopes are in harmonic progression enclose a traingle of constant area .

Watch Video Solution

Exercise Questions Asked In Previous 13 Years Exam

1. about to only mathematics

A. (-6,-11)

B. (-9,-13)

C. (-10,-15)

D. (-6,-7)

Answer: D

Watch Video Solution

2. Let P be the point (1,0) and Q be a point on the locus $y^2 = 8x$. The locus of the midpoint of PQ is

A. $x^2 - 4y + 2 = 0$

B. $x^2 + 4y + 2 = 0$

C. $y^2 + 4y + 2 = 0$

D. $y^2 - 4y + 2 = 0$

Answer: D

Watch Video Solution

3. The axis of a parabola is along the line y=x and the distance of its vertex and focus from origin are $\sqrt{2}$ and $2\sqrt{2}$, respectively. If vertex and focus both lie in the first quadrant, then find equation of the parabola.

A. $(x + y)^2 = (x - y - 2)$

B. $(x-y)^2=(x+y+2)$

C. $(x-y)^2=4(x+y-2)$

D. $(x-y)^2=8(x+y-2)$

Answer: D

Watch Video Solution

4. about to only mathematics

A. y=4(x-1)

B. y=0

C. y=-4(x-1)

D. y=-30x-50

Answer: A::B

Watch Video Solution

5. The locus of the vertex of the family of parabolas $y = \frac{a^3x^2}{3} + \frac{a^{2x}}{2} - 2a$ is $xy = \frac{105}{64}$ (b) $xy = \frac{3}{4}$ $xy = \frac{35}{16}$ (d) $xy = \frac{64}{105}$

A. $xy = \frac{105}{64}$

B. $xy = \frac{3}{4}$

C. $xy = \frac{35}{16}$

D. $xy = \frac{64}{105}$

Answer: A

Watch Video Solution

6. The angle between the tangents to the curve $y = x^2 - 5x + 6$ at the point (2, 0) and (3, 0) is (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) π (d) $\frac{\pi}{4}$

A. $\pi/3$

B. $\pi/2$

C. $\pi/6$

D. $\pi/4$

Answer: B

Watch Video Solution

7. Consider the circle $x^2 + y^2 = 9$ and the parabola $y^2 = 8x$. They intersect at P and Q in first and fourth quadrant respectively. Tangents to the circle at P and Q intersect the x-axis at R and tangents at the parabola at P and Q intersect the x-axis at S.

A. (a) $1 : \sqrt{2}$

B. (b) $1 : 2$

C. (c) $1 : 4$

D. (d) $1 : 8$

Answer: C

Watch Video Solution

8. Consider the circle $x^2 + y^2 = 9$ and the parabola $y^2 = 8x$. They intersect at P and Q in first and fourth quadrant respectively. Tangents to the circle at P and Q intersect the x-axis at R and tangents at the parabola at P and Q intersect the x-axis at S.

A. 5

B. $3\sqrt{3}$

C. $3\sqrt{2}$

D. $2\sqrt{3}$

Answer: B

Watch Video Solution

9. Find slope of tangent to the curve if equation is $x^2 + y^2 = 9$

Watch Video Solution

10. Statement 1 : The curve $y = -\frac{x^2}{2} + x + 1$ is symmetric with respect to the line $x = 1$ Statement 2 : A parabola is symmetric about its axis. Both the statements are true and Statements 1 is the correct explanation of Statement 2. Both the statements are true but Statements 1 is not the correct explanation of Statement 2. Statement 1 is true and Statement 2 is false Statement 1 is false and Statement 2 is true

A. Statement I is true, Statement II is true, Statement II is a correct explanation for Statement I

B. Statement I is true, Statement II is true, Statement II is not a corrected explanation for Statement I

C. Statement is true , Statement II is false

D. Statement I is false , Statement II is true

Answer: A

Watch Video Solution

11. The equation of a tangent to the parabola $y^2 = 8xisy = x + 2$. The point on this line from which the other tangent to the parabola is perpendicular to the given tangent is (1) $(-1, 1)$ (2) $(0, 2)$ (3) $(2, 4)$ (4) $(-2, 0)$

A. (-1,1)

B. (0,2)

C. (2,4)

D. (-2,0)

Answer: D

Watch Video Solution

12. Consider two curves $C1: y^2 = 4x$; $C2 = x^2 + y^2 - 6x + 1 = 0$. Then, a. C1 and C2 touch each other at one point b. C1 and C2 touch each other exactly at two point c. C1 and C2 intersect(but do not touch) at exactly two point d. C1 and C2 neither intersect nor touch each other

A. C_1 and C_2 touch each other only at one point

B. C_1 and C_2 touch each other exactly at two points

C. C_1 and C_2 intersect (but do not touch) at exactly two points

D. C_1 and C_2 neither intersect nor touch each other

Answer: B

Watch Video Solution

13. If a parabola has the origin as its focus and the line x = 2 as the directrix, then the coordinates of the vertex of the parabola are

A. $(0, 2)$

B. $(1, 0)$

C. $(0, 1)$

D. $(2, 0)$

Answer: B

Watch Video Solution

14. about to only mathematics

A. vertex is $\left(\frac{2a}{3}, 0\right)$

B. directrix is at x=0

C. latusrectum is $\frac{2a}{3}$

D. focus is (a,0)

Answer: A::D

Watch Video Solution

15. Let A and B be two distinct points on the parabola $y^2 = 4x$. If the axis of the parabola touches a circle of radius r having AB as its diameter, then find the slope of the line joining A and B .

A. $-\frac{1}{r}$

B. $\frac{1}{r}$

C. $\frac{2}{r}$

D. $-\frac{2}{r}$

Answer: C::D

Watch Video Solution

16. If two tangents drawn from a point P to the parabola y2 = 4x are at right angles, then the locus of P is (1) $2x + 1 = 0$ (2) $x = 1$ (3) $2x1 = 0$ (4) $x = 1$

A. 2x+1=0

B. x=-1

C. 2x-1=0

D. x=1

Answer: B

Watch Video Solution

17. about to only mathematics

Watch Video Solution

18. about to only mathematics

A. $x^2 = y$

B. $y^2 = 2x$

C. $y^2 = x$

D. $x^2 = 2y$

Answer: C

Watch Video Solution

19. about to only mathematics

A. y-x+3=0

B. y+3x-33=0

C. y+x-15=0

D. y-2x+12=0

Answer: A::B::D

Watch Video Solution

20. about to only mathematics

A. $\frac{3\sqrt{2}}{8}$

B. $\frac{8}{3\sqrt{2}}$

C. $\frac{4}{\sqrt{3}}$

D. $\frac{\sqrt{3}}{4}$

Answer: A

Watch Video Solution

21. about to only mathematics

Watch Video Solution

22. Let PQ be a focal chord of the parabola $y^2 = 4ax$. The tangents to the parabola at P and Q meet at point lying on the line

$y = 2x + a, a < 0.$

If chord PQ subtends an angle θ at the vertex of $y^2 = 4ax$, then $\tan\theta =$

A. $\frac{2}{3}\sqrt{7}$

B. $-\frac{2}{3}\sqrt{7}$

C. $\frac{2}{3}\sqrt{5}$

D. $-\frac{2}{3}\sqrt{5}$

Answer: D

Watch Video Solution

23. Let PQ be a focal chord of the parabola $y^2 = 4ax$. The tangents to the parabola at P and Q meet at point lying on the line

$y = 2x + a, a < 0.$

The length of chord PQ is

A. 7a

B. 5a

C. 2a

D. 3a

Answer: B

Watch Video Solution

24. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is

A. $1/8$

B. $2/3$

C. $1/2$

D. $3/2$

Answer: C

Watch Video Solution

25. about to only mathematics

A. 3

B. 6

C. 9

D. 15

Answer: D

Watch Video Solution

26. Let a, r, s, t be non-zero real numbers. Let $P(at^2, 2at), Q(ar^2, 2ar)$ and $S(as^2, 2as)$ be distinct points on the parabola $y^2 = 4ax$. Suppose that PQ is the

focal chord and lines QR and PK are parallel, where K the point (2a,0).

The value of r is

A. $-\frac{1}{t}$

B. $\frac{t^2+1}{t}$

C. $\frac{1}{t}$

D. $\frac{t^2-1}{t}$

Answer: D

Watch Video Solution

27. Let a, r, s, t be non-zero real numbers. Let $P(at^2, 2at), Q(ar^2, 2ar)$ and $S(as^2, 2as)$ be distinct points on the parabola $y^2 = 4ax$. Suppose that PQ is the

focal chord and lines QR and PK are parallel, where K the point (2a,0).

If st=1, then the tangent at P and the normal at S to the parabola meet at a point whose ordinate is

A. $\frac{\left(t^2+1\right)^2}{2t^3}$

B. $\frac{a\left(t^2+1\right)^2}{2t^3}$

C. $\frac{a\left(t^2+1\right)^2}{t^3}$

D. $\frac{a\left(t^2+2\right)^2}{t^3}$

Answer: B

Watch Video Solution

28. Let O be the vertex and Q be any point on the parabola, $x^2 = 8y$. It the point P divides the line segment OQ internally in the ratio 1 : 3, then the locus of P is : (1) $x^2 = y$ (2) $y^2 = x$ (3) $y^2 = 2x$ (4) $x^2 = 2y$

A. $x^2 = y$

B. $y^2 = x$

C. $y^2 = 2x$

D. $x^2 = 2y$

Answer: D

Watch Video Solution

29. If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2 + (y+2)^2 = r^2$ then the value of r^2 is _____.

Watch Video Solution

30. about to only mathematics

Watch Video Solution

31. Let P and Q be distinct points on the parabola $y^2 = 2x$ such that a circle with PQ as diameter passes through the vertex O of the parabola. If P lies in the first quadrant and the area of the triangle ΔOPQ is $3\sqrt{2}$, then which of the following is (are) the coordinates of P?

A. $(4, 2\sqrt{2})$

B. $(9, 3\sqrt{2})$

C. $\left(\frac{1}{4}, \frac{1}{\sqrt{2}}\right)$

D. $(1\sqrt{2})$

Answer: A::D

Watch Video Solution

32. Let P be the point on the parabola, $y^2 = 8x$ which is at a minimum distance from the center C of the circle , $x^2 + (y + 6)^2 = 1$. Then the equation of the circle, passing through C and having its canter at P is

A. $x^2 + y^2 - 4x + 8y + 12 = 0$

B. $x^2 + y^2 - x + 4y - 12 = 0$

C. $x^2 + y^2 - \frac{x}{4} + 2y - 24 = 0$

D. $x^2 + y^2 - 4x + 9y + 18 = 0$

Answer: A

Watch Video Solution

33. The circle C1 :$x^2 + y^2 = 3$, with center at O, intersects the parabola$x^2 = 2y$ at the point P in the first quadrant. Let the tangent to the circle C1 at P touches other two circles C2 and C3 at R2 and R3, respectively. Suppose C2 and C3 have equal radii $2\sqrt{3}$ and centers Q2 and Q3, respectively.If Q_2 and Q_3 lies on the y-axis, then

A. $Q_2Q_3 = 12$

B. $R_2R_3 = 4\sqrt{6}$

C. area of ΔOR_2R_3 is $6\sqrt{2}$

D. area of ΔPQ_2Q_3 is $4\sqrt{2}$

Answer: A::B::C

Watch Video Solution

34. Let P be the point on the parabola $y^2 4x$ which is at the shortest distance from the center S of the circle $x^2 + y^2 - 4x - 16y + 64 = 0$. Let Q be the point on the circle dividing the line segment SP internally. Then

A. $SP = 2\sqrt{5}$

B. $SQ : QP = \left(\sqrt{5} + 1\right) : 2$

C. the x-intercept of the normal to the parabola at P is 6

D. the slope of the tangent to the circle at Q is $\frac{1}{2}$

Answer: A::C::D

Watch Video Solution

35. The radius of a circle, having minimum area, which touches the curve $y = 4 - x^2$ and the lines $y = |x|$ is :

A. $4\left(\sqrt{2}+1\right)$

B. $2\left(\sqrt{2}+1\right)$

C. $2\left(\sqrt{2}-1\right)$

D. $4\left(\sqrt{2}-1\right)$

Answer: D

Watch Video Solution

36. If a chord which is not a tangent, of the parabola $y^2 = 16x$ has the equation 2x+y=p, and mid-point (h, k), then which of the following is (are) possible value (s) of p, h and k?

A. $p = 2, h = 3, k = -4$

B. $p = -1, h = 1, k = -3$

C. $p = -2, h = 2, k = -4$

D. $p = 5, h = 4, k = -3$

Answer: A

Watch Video Solution