JEE Mains & Advanced Past Years Questions

JEE-MAIN PREVIOUS YEARS

1. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is: [*JEE Main-2014*]

(*a*) $\frac{1}{8}$ (*b*) $\frac{2}{3}$

(*c*) $\frac{1}{2}$ (*d*) $\frac{3}{2}$

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

[*JEE Main-2015*]

(*a*) $x^2 = y$ (*b*) $y^2 = x$

(*c*) $y^2 = 2x$ (*d*) $x^2 = 2y$

3. Tangent and normal are drawn at $P(16, 16)$ *sq.* units the parabola $y^2 = 16x$, which intersect the axis of the parabola at A and B, respectively. If C is the centre of the circle through the points P, A and B and $\angle CPB = \theta$, then a value of $\tan\theta$ [*JEE Main-2018*]

(*a*) 2 (*b*) 3

(*c*) $\frac{4}{3}$ (*d*) $\frac{1}{2}$

4. Axis of a parabola lies along x-axis. If its vertex and focus are at distance 2 and 4 respectively from the origin, on the positive x-axis then which of the following points does not lie on it? [*JEE Main-2019 (January)*]

(*a*) $(5, 2\sqrt{6})$ (*b*) $(8, 6)$

(*c*) $(6, 4\sqrt{2})$ (*d*) $(4, -4)$

5. Equation of a common tangent to the circle, $x^2 + y^2 - 6x = 0$ and the parabola, $y^2 = 4x$, is : [*JEE Main-2019 (January)*]

(*a*) $2\sqrt{3}y = 12x + 1$ (*b*) $\sqrt{3}y = x + 3$

(*c*) $2\sqrt{3}y = -x - 12$ (*d*) $\sqrt{3}y = 3x + 1$

6. Let $A(4, -4)$ and $B(9, 6)$ be points on the parabola $y^2 = 4x$. Let C be chosen on the arc AOB of the parabola, where O is the origin, such that the area of ΔACB is maximum. Then, the area (in sq. units) of ΔACB, is: [*JEE Main-2019 (January)*]

(*a*) $31\frac{3}{4}$ (*b*) 32

(*c*) $30\frac{1}{2}$ (*d*) $31\frac{1}{4}$

7. The shortest distance between the point $\left(\frac{3}{2}, 0\right)$ and the curve $y = \sqrt{x}\,(x > 0)$, is: [*JEE Main-2019 (January)*]

(*a*) $\frac{\sqrt{5}}{2}$ (*b*) $\frac{\sqrt{3}}{2}$

(*c*) $\frac{3}{2}$ (*d*) $\frac{5}{4}$

8. If the parabolas $y^2 = 4b(x - c)$ and $y^2 = 8ax$ have three common normals, then which one of the following is a valid choice for the ordered triad (a, b, c)? [*JEE Main-2019 (January)*]

(*a*) $\left(\frac{1}{2}, 2, 3\right)$ (*b*) $(1, 1, 3)$

(*c*) $\left(\frac{1}{2}, 2, 0\right)$ (*d*) $(1, 1, 0)$

9. The length of the chord of the parabola $x^2 = 4y$ having equation $x - \sqrt{2}y + 4\sqrt{2} = 0$ is : [*JEE Main-2019 (January)*]

(*a*) $3\sqrt{2}$ (*b*) $2\sqrt{11}$

(*c*) $8\sqrt{2}$ (*d*) $6\sqrt{3}$

10. If the area of the triangle whose one vertex is the vertex of the parabola, $y^2 + 4(x - a^2) = 0$ and the other two vertices are the points of intersection of the parabola and y-axis, is 250 sq. units, then a value of 'a' is: [*JEE Main-2019 (January)*]

(*a*) $5\sqrt{5}$ (*b*) $5(2^{1/3})$

(*c*) $(10)^{2/3}$ (*d*) 5

11. Equation of a common tangent to the parabola $y^2 = 4x$ and the hyperbola $xy = 2$ is :- [*JEE Main-2019 (January)*]

(*a*) $x + y + 1 = 0$ (*b*) $x - 2y + 4 = 0$

(*c*) $x + 2y + 4 = 0$ (*d*) $4x + 2y + 1 = 0$

12. The equation of a tangent to the parabola, $x^2 = 8y$, which makes an angle θ with the positive direction of x-axis, is [*JEE Main-2019 (January)*]

(*a*) $y = x\tan\theta + 2\cot\theta$ (*b*) $y = x\tan\theta - 2\cot\theta$

(*c*) $x = y\cot\theta + 2\tan\theta$ (*d*) $x = y\cot\theta - 2\tan\theta$

13. The shortest distance between the line $y = x$ and the curve $y^2 = x - 2$ is : [*JEE Main-2019 (April)*]

(*a*) $\frac{7}{4\sqrt{2}}$ (*b*) $\frac{7}{8}$

(*c*) $\frac{11}{4\sqrt{2}}$ (*d*) 2

14. The tangent to the parabola $y^2 = 4x$ at the point where it intersects the circle $x^2 + y^2 = 5$ in the first quadrant, passes through the point : [JEE Main-2019 (April)]

(a) $\left(-\frac{1}{3}, \frac{4}{3}\right)$ (b) $\left(-\frac{1}{4}, \frac{1}{2}\right)$

(c) $\left(\frac{3}{4}, \frac{7}{4}\right)$ (d) $\left(\frac{1}{4}, \frac{3}{4}\right)$

15. If one end of a focal chord of the parabola, $y^2 = 16x$ is at (1, 4), then the length of this focal chord is [JEE Main-2019 (April)]

(a) 25 (b) 24

(c) 20 (d) 22

16. If the tangent to the parabola $y^2 = x$ at a point (α, β), $(\beta > 0)$ is also a tangent to the ellipse, $x^2 + 2y^2 = 1$, then a is equal to: [JEE Main-2019 (April)]

(a) $2\sqrt{2}+1$ (b) $\sqrt{2}-1$

(c) $\sqrt{2}+1$ (d) $2\sqrt{2}-1$

17. The area (in sq. units) of the smaller of the two circles that touch the parabola, $y^2 = 4x$ at the point (1, 2) and the x-axis is :- [JEE Main-2019 (April)]

(a) $4\pi(2-\sqrt{2})$ (b) $8\pi(3-2\sqrt{2})$

(c) $4\pi(3+\sqrt{2})$ (d) $8\pi(2-\sqrt{2})$

18. If the line $ax + y = c$, touches both the curves $x^2 + y^2 = 1$ and $y^2 = 4\sqrt{2}x$, then $|c|$ is equal to: [JEE Main-2019 (April)]

(a) 1/2 (b) 2

(c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$

19. Let P be the point of intersection of the common tangents to the parabola $y^2 = 12x$ and the hyperbola $8x^2 - y^2 = 8$. If S and denote the foci of the hyperbola where S lies on the positive x-axis then P divides SS' in a ratio: [JEE Main-2019 (April)]

(a) 5 : 4 (b) 14 : 13

(c) 2 : 1 (d) 13 : 11

20. The tangents to the curve $y = (x-2)^2 - 1$ at its points of intersection with the line $x - y = 3$, intersect at the point : [JEE Main-2019 (April)]

(a) $\left(-\frac{5}{2}, 1\right)$ (b) $\left(-\frac{5}{2}, 1\right)$

(c) $\left(\frac{5}{2}, -1\right)$ (d) $\left(\frac{5}{2}, 1\right)$

21. The equation of a common tangent to the curves, $y^2 = 16x$ and $xy = -4$ is : [JEE Main-2019 (April)]

(a) $x + y + 4 = 0$

(b) $x - 2y + 16 = 0$

(c) $2x - y + 2 = 0$

(d) $x - y + 4 = 0$

22. If $y = mx + 4$ is a tangent to both the parabolas, $y^2 = 4x$ and $x^2 = 2by$, then b is equal to [JEE Main-2020 (January)]

(a) -64 (b) -32

(c) -128 (d) 128

23. The locus of a point which divides the line joining the point (0, – 1) and a point on the parabola, $x^2 = 4y$, internally in the ratio 1:2, is [JEE Main-2020 (January)]

(a) $9x^2 - 12y = 8$

(b) $x^2 - 3y = 2$

(c) $9x^2 - 3y = 2$

(d) $4x^2 - 3y = 2$

24. Let a line $y = mx$ $(m > 0)$ intersect the parabola, $y^2 = x$ at a point P, other than the origin. Let the tangent to it at P meet the x-axis at the point Q. If area $(\Delta OPQ) = 4$ sq. units, then m is equal to [JEE Main-2020 (January)]

25. If one end of a focal chord AB of the parabola $y^2 = 8x$ is at $A\left(\frac{1}{2}, -2\right)$, then the equation of the tangent to it at B is: [JEE Main-2020 (January)]

(a) $x - 2y + 8 = 0$ (b) $x + 2y + 8 = 0$

(c) $2x - y - 24 = 0$ (d) $2x + y - 24 = 0$

26. The area (in sq. units) of an equilateral triangle inscribed in the parabola $y^2 = 8x$, with one of its vertices on the vertex of this parabola, is : [JEE Main-2020 (September)]

(a) $64\sqrt{3}$ (b) $256\sqrt{3}$

(c) $128\sqrt{3}$ (d) $192\sqrt{3}$

27. If the tangent to the curve, $y = e^x$ at a point (c, e^c) and the normal to the parabola, $y^2 = 4x$ at the point (1, 2) intersect at the same point on the x-axis, then the value of c is _____ . [JEE Main-2020 (September)]

28. Let P be a point on the parabola, $y^2 = 12x$ and N be the foot of the perpendicular drawn from P on the axis of the parabola. A line is now drawn through the mid-point M of PN, parallel to its axis which meets the parabola at Q. If the y-intercept of the line NQ is 4/3 then: [JEE Main-2020 (September)]

(a) $MQ = \frac{1}{4}$ (b) $PN = 3$

(c) $PN = 4$ (d) $MQ = \frac{1}{3}$

29. If the common tangent to the parabolas, $y^2 = 4x$ and $x^2 = 4y$ also touches the circle, $x^2 + y^2 = c^2$, then c is equal to : [JEE Main-2020 (September)]

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$

(c) $\frac{1}{2\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$

30. The centre of the circle passing through the point (0, 1) and touching the parabola $y = x^2$ at the point (2, 4) is :

[JEE Main-2020 (September)]

(a) $\left(\frac{-53}{10}, \frac{16}{5}\right)$ (b) $\left(\frac{6}{5}, \frac{53}{10}\right)$

(c) $\left(\frac{-16}{5}, \frac{53}{10}\right)$ (d) $\left(\frac{3}{10}, \frac{16}{5}\right)$

31. Let L_1 be a tangent to the parabola $y^2 = 4(x + 1)$ and L_2 be a tangent to the parabola $y^2 = 8(x + 2)$ such that L_1 and L_2 intersect at right angles. Then L_1 and L_2 meet on the straight line: [JEE Main-2020 (September)]

(a) $2x + 1 = 0$ (b) $x + 3 = 0$

(c) $x + 2y = 0$ (d) $x + 2 = 0$

32. The locus of the mid-point of the line segment joining the focus of the parabola $y^2 = 4ax$ to a moving point of the parabola, is another parabola whose directrix is:

[JEE Main-2021]

(a) $x = a$ (b) $x = 0$

(c) $x = -\frac{a}{2}$ (d) $\frac{a}{2}$

33. If P is a point on the parabola $y = x^2 + 4$ which is closest to the straight line $y = 4x - 1$, then the co-ordinates of P are: [JEE Main-2021]

(a) (–2, 8) (b) (1, 5)

(c) (3, 13) (d) (2, 8)

34. A tangent is drawn to the parabola $y^2 = 6x$ which is perpendicular to the line $2x + y = 1$. Which of the following points does NOT lie on it? [JEE Main-2021]

(a) (0, 3) (b) (–6, 0)

(c) (4, 5) (d) (5, 4)

35. A line is a common tangent to the circle $(x - 3)^2 + y^2 = 9$ and the parabola $y^2 = 4x$. If the two points of contact (a, b) and (c, d) are distinct and lie in the first quadrant, then $2(a + c)$ is equal to [JEE Main-2021]

36. If the three normals drawn to the parabola, $y^2 = 2x$ pass through the point $(a, 0) a \neq 0$, then 'a'must be greater than: [JEE Main-2021]

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$

(c) –1 (d) 1

JEE-ADVANCED PREVIOUS YEARS

1. Let S be the focus of the parabola $y^2 = 8x$ and let PQ be the common chord of the circle $x^2 + y^2 - 2x - 4y = 0$ and the given parabola. The area of the triangle PQS is.

[IIT JEE-2012]

Comprehension – 1 (Q. No. 2 to 4)

Let PQ be a focal chord of the parabola $y^2 = 4ax$. The tangents to the parabola at P and Q meet at a point lying on the line $y = 2x + a$, $a > 0$. [JEE Advanced-2013]

2. Length of chord PQ is

(a) $7a$ (b) $5a$

(c) $2a$ (d) $3a$

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

4. The common tangents to the circle $x^2 + y^2 = 2$ and the parabola $y^2 = 8x$ touch the circle at the points P, Q and the parabola at the points R, S. Then the area of the quadrilateral $PQRS$ is [JEE Advanced-2014]

(a) 3 (b) 6

(c) 9 (d) 15

Comprehension – 2 (Q. No. 5 & 6)

Let a, r, s, t be nonzero real numbers. Let $P(at^2, 2at)$, Q, R $(ar^2, 2ar)$ and $(as^2, 2as)$ 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 is the point $(2a, 0)$

[JEE Advanced-2014]

5. The value of r is

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

(c) $\frac{1}{t}$ (d) $\frac{t^2 - 1}{t}$

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

(a) $\frac{(t^2 + 1)^2}{2t^3}$ (b) $\frac{a(t^2 + 1)^2}{2t^3}$

(c) $\frac{a(t^2 + 1)^2}{t^3}$ (d) $\frac{a(t^2 + 2)^2}{t^3}$

7. If a chord, which is not a tangent, of the parabola $y^2 = 16x$ has the equation $2x + y = p$, and midpoint (h, k) then which of the following is (are) possible value(s) of p, h and k? [JEE Advanced -2017]

(a) $p = -1, h = 1, k = -3$

(b) $p = 2, h = 3, k = -4$

(c) $p = -2, h = 2, k = -4$

(d) $p = 5, h = 4, k = -3$

Give the answer Q.8, Q.9 and Q.10 by appropriately matching the information given in the three columns of the following table.

Columns 1, 2 and 3 contain conics, equations of tangents to the conics and points of contact, repectively.

Column-1	Column-2	Column-3
(I) $x^2+y^2=a^2$	*(i)* $my=m^2x+a$	*(P)* $\left(\frac{a}{m^2},\frac{2a}{m}\right)$
(II) $x^2+a^2y^2=a^2$	*(ii)* $y=mx+a\sqrt{m^2+1}$	*(Q)* $\left(\frac{-ma}{\sqrt{m^2+1}},\frac{a}{\sqrt{m^2+1}}\right)$
(III) $y^2=4ax$	*(iii)* $y=mx+\sqrt{a^2m^2-1}$	*(R)* $\left(\frac{-a^2m}{\sqrt{a^2m^2+1}},\frac{1}{\sqrt{a^2m^2+1}}\right)$
(IV) $x^2-a^2y^2=a^2$	*(iv)* $y=mx+\sqrt{a^2m^2+1}$	*(S)* $\left(\frac{-a^2m}{\sqrt{a^2m^2-1}},\frac{-1}{\sqrt{a^2m^2-1}}\right)$

[JEE Advanced-2017]

8. For $a=\sqrt{2}$, if a tangent is drawn to a suitable conic (Column 1) at the point of contact $(-1, 1)$, then which of the following options is the only CORRET combination for obtaining its equation ?

(*a*) (I) (ii) (Q)

(*b*) (I) (i) (P)

(*c*) (III) (i) (P)

(*d*) (II) (ii) (Q)

9. The tangent to a suitable conic (Column 1) at $\left(\sqrt{3},\frac{1}{2}\right)$ is found to be $\sqrt{3}x+2y=4$, then which of the following options is the only CORRECT combination?

(*a*) (IV) (iv) (S) (*b*) (II) (iv) (R)

(*c*) (IV) (iii) (S) (*d*) (II) (iii) (R)

10. If a tangent to a suitable conic (Column 1) is found to be $y=x+8$ and its point of contact is $(8, 16)$, then which of the following options is the only CORRECT combination?

(*a*) (III) (i) (P) (*b*) (I) (ii) (Q)

(*c*) (II) (iv) (R) (*d*) (III) (ii) (Q)

11. Let E denote the parabola $y^2=8x$. Let $P=(-2, 4)$ and let Q and Q' be two distinct points on E such that the lines PQ and PQ' are tangents to E. Let F be the focus of E. Then which of the following statements is(are) True?

[JEE Advance-2021]

(*a*) The triangle PFQ is a right-angled triangle

(*b*) The triangle QPQ' is a right-angle triangle

(*c*) The distance between P and F is $5\sqrt{2}$

(*d*) F lies on the line joining Q and Q'

JEE Mains & Advanced Past Years Questions

JEE-MAIN
PREVIOUS YEARS

1. (*c*)	**2.** (*d*)	**3.** (*a*)	**4.** (*b*)	**5.** (*b*)	**6.** (*d*)	**7.** (*a*)	**8.** (*b*)	**9.** (*d*)	**10.** (*d*)	**11.** (*c*)	**12.** (*c*)
13. (*a*)	**14.** (*c*)	**15.** (*a*)	**16.** (*c*)	**17.** (*b*)	**18.** (*c*)	**19.** (*a*)	**20.** (*c*)	**21.** (*d*)	**22.** (*c*)	**23.** (*a*)	**24.** [0.5]
25. (*a*)	**26.** (*d*)	**27.** (4)	**28.** (*a*)	**29.** (*d*)	**30.** (*c*)	**31.** (*b*)	**32.** (*b*)	**33.** (*d*)	**34.** (*d*)	**35.** (9)	**36.** (*d*)

JEE-ADVANCED
PREVIOUS YEARS

1. (*d*)	**2.** (*b*)	**3.** (*d*)	**4.** (*d*)	**5.** (*d*)	**6.** (*b*)	**7.** (*b*)	**8.** (*a*)	**9.** (*b*)	**10.** (*a*)	**11.** (*a*, *b*, *d*)