JEE Mains & Advanced Past Years Questions

JEE-MAIN
PREVIOUS YEARS

1. The eccentricity of the hyperbola whose length of the latusrectum is equal to 8 and the length of conjugate axis is equal to half of the distance between its foci, is

[*JEE Main-2016*]

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

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

2. A hyperbola passes through the point $p(\sqrt{2},\sqrt{3})$ and has foci *at* $(\pm 2, 0)$. The nth tangent to this hyperbola at P also passes through the point. [*JEE Main-2017*]

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

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

3. Let $0<\theta<\frac{\pi}{2}$. If the eccentricity of the hyperbola $\frac{x^2}{\cos^2\theta}-\frac{y^2}{\sin^2\theta}=1$ is greater than 2, then the length of its latus rectum lies in the interval:

[*JEE Main-2019 (January)*]

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

(*c*) $(2,3]$ (*d*) $\left(1,\frac{3}{2}\right]$

4. A hyperbola has its centre at the origin, passes through the point (4, 2) and has transverse of axis of length 4 along the x-axis. Then the eccentricity of the hyperbola is: [*JEE Main-2019 (January)*]

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

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

5. The equation of a tengent to the hyperbola $4x^2-5y^2=20$ parallel to the line $x-y=2$ is: [*JEE Main-2019 (January)*]

(*a*) $x-y+1=0$ (*b*) $x-y+7=0$

(*c*) $x-y+9=0$ (*d*) $x-y-3=0$

6. If a hyperbola has length of its conjugate axis equal to 5 and the distance between its foci is 13, then the eccentricity of the hyperbola is:

[*JEE Main-2019 (January)*]

(*a*) 13/12 (*b*) 2

(*c*) 13/6 (*d*) 13/8

7. If the vertices of a hyperbola be at (–2, 0) and (2, 0) and one of its foci be *at* (–3, 0), then which one of the following points does not lie on this hyperbola?

[*JEE Main-2019 (January)*]

(*a*) $(-6,2\sqrt{10})$ (*b*) $(2\sqrt{6},5)$

(*c*) $(4,\sqrt{15})$ (*d*) $(6,5\sqrt{2})$

8. If the eccentricity of the standard hyperbola passing through the point (4,6) is 2, then the equation of the tangent of the hyperbola at (4,6) is

[*JEE Main-2019 (April)*]

(*a*) $2x-y-2=0$ (*b*) $3x-2y=0$

(*c*) $2x-3y+10=0$ (*d*) $x-2y+8=0$

9. If the line $y=mx+7\sqrt{3}$ is normal to the hyperbola $\frac{x^2}{24}-\frac{y^2}{18}=1$, then a value of m is

[*JEE Main-2019 (April)*]

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

(*c*) $\frac{2}{\sqrt{5}}$ (*d*) $\frac{\sqrt{15}}{2}$

10. If $5x+9=0$ is the directrix of the hyperbola $16x^2-9y^2=144$, then its corresponding focus is: [*JEE Main-2019 (April)*]

(*a*) $\left(-\frac{5}{3},0\right)$ (*b*) $(5,0)$

(*c*) $(-5,0)$ (*d*) $\left(\frac{5}{3},0\right)$

11. If a directrix of a hyperbola centred at the origin and passing through the point $(4,-2\sqrt{3})$ is $5x=4\sqrt{5}$ and its eccentricity is e, then: [*JEE Main-2019 (April)*]

(*a*) $4e^4-24e^2+35=0$ (*b*) $4e^4-8e^2-35=0$

(*c*) $4e^4-12e^2-27=0$ (*d*) $4e^4-24e^2+27=0$

12. If a hyperbola passes through the point $P(10, 16)$ and it has vertices at $(\pm6, 0)$, then the equation of the normal to it at P is [*JEE Main-2020 (January)*]

(*a*) $x+3y=58$ (*b*) $x+2y=42$

(*c*) $3x+4y=94$ (*d*) $2x+5y=100$

13. If e_1 and e_2 are the eccentricities of the ellipse, $\frac{x^2}{18}+\frac{y^2}{4}=1$ and the hyperbola, $\frac{x^2}{9}-\frac{y^2}{4}=1$ respectively and (e_1, e_2) is a point on the ellipse, $15x^2+3y^2=k$, then k is equal to

[*JEE Main-2020 (January)*]

(*a*) 14 (*b*) 15

(*c*) 16 (*d*) 17

14. For some $\theta\in\left(0,\frac{\pi}{2}\right)$, if the eccentricity of the hyperbola, $x^2-y^2\sec^2\theta=10$ is $\sqrt{5}$ times the eccentricity of the ellipse, $x^2\sec^2\theta+y^2=5$, then the length of the latus rectum of the ellipse, is : [*JEE Main-2020 (September)*]

(*a*) $2\sqrt{6}$ (*b*) $\frac{2\sqrt{5}}{3}$

(*c*) $\frac{4\sqrt{5}}{3}$ (*d*) $\sqrt{30}$

15. A line parallel to the straight line $2x-y=0$ is tangent to the hyperbola $\frac{x^2}{4}-\frac{y^2}{2}=1$ at the point (x_1, y_1). Then $x_1^2+5y_1^2$ is equal to: [*JEE Main-2020 (September)*]

(*a*) 8 (*b*) 6

(*c*) 10 (*d*) 5

16. Let e_1 and e_2 be the eccentricities of the ellipse, $\frac{x^2}{25}+\frac{y^2}{b^2}=1(b<5)$ and the hyperbola, $\frac{x^2}{16}-\frac{y^2}{b^2}=1$ respectively satisfying $e_1e_2=1$. If α and β are the dist ances between the foci of the ellipse and the foci of the hyperbola respectively, then the ordered pair (α, β) is equal to: [*JEE Main-2020 (September)*]

(*a*) $(8,10)$ (*b*) $\left(\frac{24}{5},10\right)$

(*c*) $\left(\frac{20}{3},12\right)$ (*d*) $(8,12)$

17. A hyperbol a having the transverse axis of length $\sqrt{2}$ has the same foci as that of the ellipse of $3x^2+4y^2=12$, then this hyperbola does not pass through which of the following points? [*JEE Main-2020 (September)*]

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

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

18. Let $P(3, 3)$ be a point on the hyperbola, $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. If the normal to it at P intersects the x-axis at $(9, 0)$ and e is its eccentricity, then the ordered pair (a^2, e^2) is equal to:

[*JEE Main-2020 (September)*]

(*a*) $(9,3)$ (*b*) $\left(\frac{9}{2},3\right)$

(*c*) $\left(\frac{3}{2},2\right)$ (*d*) $\left(\frac{9}{2},2\right)$

19. If the line $y=mx+c$ is a common tangent to the hyperbola $\frac{x^2}{100}-\frac{y^2}{64}=1$ and the circle $x^2+y^2=36$, then which one of the following is true ? [*JEE Main-2020 (September)*]

(*a*) $5m=4$

(*b*) $8m+5=0$

(*c*) $c^2=369$

(*d*) $4c^2=369$

20. The locus of the midpoints of the chord of the circle, $x^2+y^2=25$ which is tangent to the hyperbola, $\frac{x^2}{9}-\frac{y^2}{16}=1$, is : [*JEE Main-2021 (March)*]

(*a*) $\left(x^2+y^2\right)^2-9x^2+16y^2=0$

(*b*) $\left(x^2+y^2\right)^2-9x^2+144y^2=0$

(*c*) $\left(x^2+y^2\right)^2-16x^2+9y^2=0$

(*d*) $\left(x^2+y^2\right)^2-9x^2-16y^2=0$

21. The locus of the mid points of the chords of the hyperbola $x^2 - y^2 = 4$, which touch the parabola $y^2 = 8x$, is:

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

(*c*) $y^2(x-2) = x^3$ (*d*) $x^2(x-2) = y^3$

[*JEE Main-2021 (August)*]

22. The locus of the centroid of the triangle formed by any point P on the hyperbola $16x^2 - 9y^2 + 32x + 36y - 164 = 0$, and its foci is: [*JEE Main-2021 (July)*]

(*a*) $16x^2 - 9y^2 + 32x + 36y - 36 = 0$

(*b*) $9x^2 - 16y^2 + 36x + 32y - 144 = 0$

(*c*) $16x^2 - 9y^2 + 32x + 36y - 144 = 0$

(*d*) $9x^2 - 16y^2 + 36x + 32y - 36 = 0$

23. Let a line $L: 2x + y = k, k > 0$ be a tangent to the hyperbola $x^2 - y^2 = 3$. If L is also a tangent to the parabola $y^2 = \alpha x$, then α is equal to: [*JEE Main-2021 (July)*]

(*a*) 12 (*b*) –12

(*c*) 24 (*d*) –24

24. Consider a hyperbola $H: x^2 - 2y^2 = 4$. Let the tangent at a point $P(4, \sqrt{6})$ meet the x-axis at Q and latus rectum at $R(x_1, y_1), x_1 \geq 0$. If F is a focus of H which is nearer to the point P, then the area of ΔQFR is equal to :

(*a*) $\sqrt{6} - 1$ (*b*) $\frac{7}{\sqrt{6}} - 2$

(*c*) $4\sqrt{6} - 1$ [*JEE Main-2021 (March)*]

JEE-ADVANCED PREVIOUS YEARS

1. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$, parallel to the straight line $2x - y = 1$. The points of contacts of the tangents on the hyperbola are

[*IIT JEE-2012*]

(*a*) $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

(*b*) $\left(-\frac{9}{2\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

(*c*) $(3\sqrt{3}, -2\sqrt{2})$

(*d*) $(-3\sqrt{3}, 2\sqrt{2})$

2. If $2x - y + 1 = 0$ is a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{16} = 1$, then which of the following CANNOT be sides of a right angled triangle? [*JEE Advanced-2017*]

(*a*) $a, 4, 1$ (*b*) $2a, 4, 1$

(*c*) $a, 4, 2$ (*d*) $2a, 8, 1$

3. Let $H: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, where $a > b > 0$, be a hyperbola in the xy-plane whose conjugate axis LM subtends an angle of 60° at one of its vertices N. Let the area of the triangle LMN be $4\sqrt{3}$.

[*JEE Advanced-2018*]

LIST-I	**LIST-II**
(*P*) The length of the conjugate	(1) 8 axis of H is
(*Q*) The eccentricity of H is	(2) $\frac{4}{\sqrt{3}}$
(*R*) The distance between	(3) $\frac{2}{\sqrt{3}}$ the foci of H is
(*S*) The length of the latus	(4) 4 rectum of H is

The correct option is :

(*a*) $P \to 4$; $Q \to 2$; $R \to 1$; $S \to 3$

(*b*) $P \to 4$; $Q \to 3$; $R \to 1$; $S \to 2$

(*c*) $P \to 4$; $Q \to 1$; $R \to 3$; $S \to 2$

(*d*) $P \to 3$; $Q \to 4$; $R \to 2$; $S \to 1$

4. Let a and b be positive real numbers such that $a > 1$ and $b < a$. Let P be a point in the first quadrant that lies on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. Suppose the tangent to the hyperbola at P passes through the point $(1,0)$, and suppose the normal to the hyperbola at P cuts off equal intercepts on the coordinate axes. Let Δ denote the area of the triangle formed by the tangent at P, the normal at P and the x-axis. If e denotes the eccentricity of the hyperbola, then which of the following statements is/are TRUE? [*JEE Advanced-2020*]

(*a*) $1 < e < \sqrt{2}$ (*b*) $\sqrt{2} < e < 2$

(*c*) $\Delta = a^4$ (*d*) $\Delta = b^4$

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JEE-MAIN
PREVIOUS YEARS

1. (*c*)	**2.** (*c*)	**3.** (*a*)	**4.** (*a*)	**5.** (*a*)	**6.** (*a*)	**7.** (*d*)	**8.** (*a*)	**9.** (*c*)	**10.** (*c*)	**11.** (*a*)	**12.** (*d*)
13. (*c*)	**14.** (*c*)	**15.** (*b*)	**16.** (*a*)	**17.** (*b*)	**18.** (*b*)	**19.** (*d*)	**20.** (*a*)	**21.** (*c*)	**22.** (*a*)	**23.** (*d*)	**24.** (*b*)

JEE-ADVANCED
PREVIOUS YEARS

1. (*a*, *b*)	**2.** (*a*, *c*, *d*)	**3.** (*b*)	**4.** (*a*, *d*)