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MATHEMATICS · JEE MAIN

Hyperbola

Previous Year Questions with answers

101 questions · **97** papers · **2003–2026** · newest paper first

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What is in this PDF: every Hyperbola question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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Chapter at a glance

1.8%
of Mathematics questions, 2019–2026

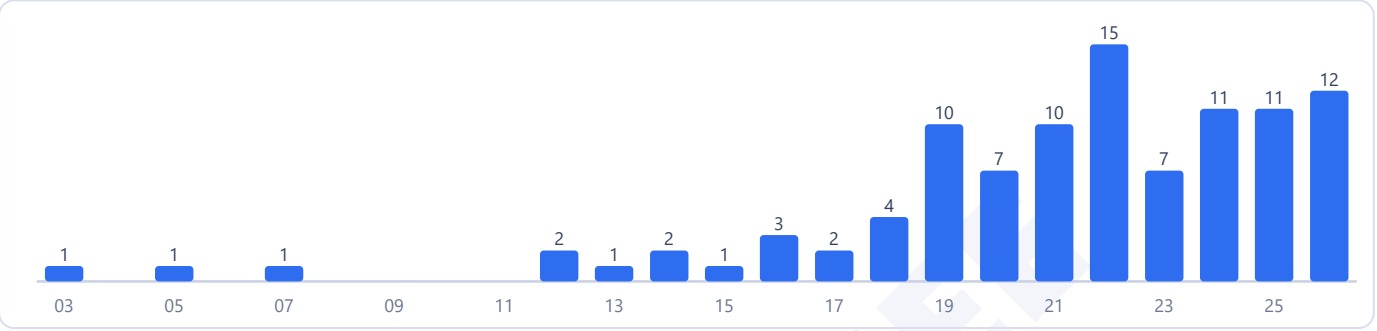
101
questions, 2003–2026

79 of 162
papers asked it, 2019–2026

75 / 26
MCQ / numerical, 2003–2026

Trend. Steady: 0.6 questions per paper in 2024–2026 against 0.5 in 2019–2023.

Questions per year



Counts are the questions we hold: 101 in 97 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2003–2026)

Standard Forms	59
Tangents, Normals & Chords	42

How often it comes up

Hyperbola completes the conic sections curriculum under Unit 10: Coordinate Geometry in the Class 11 curriculum, occupying rank 24 among the 29 chapters in the subject. Between 2019 and 2026, 83 questions were asked from this chapter across 162 papers, representing 1.8 percent of all mathematics questions. It appeared in 79 of those 162 papers and has been tested every single year since 2019. In the recent 2024 to 2026 testing sessions, it delivered 34 questions across 58 papers, averaging 0.6 questions per paper and holding a 2.2 percent subject share. Comparing the earlier 2002 to 2018 share of 1.4 percent against 2024 to 2026 shows that its long-term share is up, while comparing 2019 to 2026 with 2024 to 2026 shows it is about the same. Over the entire 2003 to 2026 historical record across 200 papers, 101 questions were asked in 97 papers, with 26 numerical answer questions appearing between 2019 and 2026.

In the 2024, 2025, and 2026 test cycles, the question volumes were 11, 11, and 12 questions respectively, maintaining an exceptionally stable level of appearances.

Examiners frequently formulate confocal conic questions where an ellipse and a hyperbola share the same foci. In addition, problems often investigate conditions of tangency, non-intersection conditions between secant lines and hyperbola branches, or focal triangle areas.

Most-asked topics

Questions in this chapter concentrate under two primary topic headings:

1. **Standard Forms (49 questions, 2019-2026; 59 total, last asked 2026)** The largest subtopic in the chapter. Covers equations of horizontal and conjugate vertical hyperbolas, transverse and conjugate axes, eccentricity formulas linking a and b, coordinates of foci and vertices, directrix equations, latus rectum length, focal radii properties where the absolute difference of SP and S'P equals 2a, rectangular hyperbolas, and parametric forms using sec theta and tan theta.

2. **Tangents, Normals & Chords (34 questions, 2019-2026; 42 total, last asked 2026)** Involves conditions of tangency where c squared equals a squared m squared minus b squared, director circles, chords with given midpoints, chords of contact, asymptotes, and conditions under which a straight line fails to intersect the curve.

What the questions look like

Examiners test hyperbola mechanics using recurring geometric setups:

- **Confocal Ellipse and Hyperbola**: An ellipse and a hyperbola share identical foci. Knowing the dimensions of one conic allows the parameters of the partner conic to be derived directly.
- **Line Intersecting or Missing the Hyperbola**: A line equation with an unknown parameter is tested for intersection. Substituting into the hyperbola produces a quadratic whose discriminant determines intersection or tangency.
- **Focal Triangle Area and Latus Rectum**: A point P on the hyperbola forms a triangle with the two foci S and S'. Evaluating the area of triangle PSS' yields unknown geometric parameters.
- **Conjugate Hyperbolas**: Working with the vertical form where the transverse axis lies along the vertical coordinate axis and the eccentricity identity swaps signs.

How to practise it

Confidence in hyperbola problems depends on keeping minus signs and eccentricity relations organized:

- **Distinguish standard and conjugate forms**: For x squared over a squared minus y squared over b squared equals one, the eccentricity relation is b squared equals a squared multiplied by e squared minus one. For the conjugate hyperbola minus x squared over a squared plus y squared over b squared equals one, the relation swaps to a squared equals b squared multiplied by e squared minus one.
- **Leverage the focal difference identity**: Remember that for any point P on a hyperbola, the absolute difference between the distances to the two foci is always constant and equal to 2a. In triangle problems involving both foci, applying this difference alongside the law of cosines often cracks the question immediately.
- **Watch the tangency sign change**: The condition of tangency for a hyperbola is c squared equals a squared m squared minus b squared. Contrast this with the plus sign in the ellipse condition. If a squared m squared is strictly less than b squared, no real tangents with slope m can exist.
- **Exploit rectangular hyperbola properties**: For a rectangular hyperbola x squared minus y squared equals a squared, the eccentricity is always the square root of two, and the asymptotes are perpendicular. When expressed in rotated coordinates as xy equals c squared, the parametric point is (ct, c over t).

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Q1 JEE Main 2026 · 6 Apr · Shift 1 MCQ

If the eccentricity e of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, passing through $(6, 4\sqrt{3})$, satisfies $15(e^2 + 1) = 34e$, then the length of the latus rectum of the hyperbola $\frac{x^2}{b^2} - \frac{y^2}{2(a^2+1)} = 1$ is:

(A) 10
(B) 20
(C) 25
(D) 30

Answer: (A) 10 · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 2 MCQ

The eccentricity of an ellipse E with centre at the origin O is $\frac{\sqrt{3}}{2}$ and its directrices are $x = \pm\frac{4\sqrt{6}}{3}$. Let $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be a hyperbola whose eccentricity is equal to the length of semi-major axis of E, and whose length of latus rectum is equal to the length of minor axis of E. Then the distance between the foci of H is :

(A) $\frac{4\sqrt{2}}{\sqrt{7}}$
(B) $\frac{4\sqrt{2}}{7}$
(C) $\frac{4}{\sqrt{7}}$
(D) $\frac{8}{7}$

Answer: (D) $\frac{8}{7}$ · Official NTA final key

Q3 JEE Main 2026 · 5 Apr · Shift 2 MCQ

Let the eccentricity e of a hyperbola satisfy the equation $6e^2 - 11e + 3 = 0$. If the foci of the hyperbola are $(3, 5)$ and $(3, -4)$, then the length of its latus rectum is :

(A) 11/3
(B) 17/3
(C) 15/2
(D) 17/2

Answer: (C) 15/2 · Official NTA final key

Q4 JEE Main 2026 · 4 Apr · Shift 2 MCQ

Let $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be a hyperbola such that the distance between its foci is 6 and the distance between its directrices is $\frac{8}{3}$. If the line $x = \alpha$ intersects the hyperbola H at the points A and B such that

the area of the triangle AOB is $4\sqrt{15}$, where O is the origin, then α^2 equals

(A) 12
(B) 16
(C) 24
(D) 25

Answer: (B) 16 · Official NTA final key

Q5 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Let O be the origin, and P and Q be two points on the rectangular hyperbola $xy = 12$ such that the mid point of the line segment PQ is $\left(\frac{1}{2}, -\frac{1}{2}\right)$. Then the area of the triangle OPQ equals :

(A) $\frac{3}{2}$
(B) $\frac{5}{2}$
(C) $\frac{7}{2}$
(D) $\frac{9}{2}$

Answer: (C) $\frac{7}{2}$ · Official NTA final key

Q6 JEE Main 2026 · 28 Jan · Shift 1 Numerical

For some $\theta \in \left(0, \frac{\pi}{2}\right)$, let the eccentricity and the length of the latus rectum of the hyperbola $x^2 - y^2\sec^2\theta = 8$ be e_1 and l_1, respectively, and let the eccentricity and the length of the latus rectum of the ellipse $x^2\sec^2\theta + y^2 = 6$ be e_2 and l_2, respectively. If $e_1^2 = e_2^2\left(\sec^2\theta + 1\right)$, then $\left(\frac{l_1 l_2}{e_1 e_2}\right)\tan^2\theta$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 8. · Official NTA final key

Q7 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Let the ellipse $\mathrm{E} : \frac{x^2}{144} + \frac{y^2}{169} = 1$ and the hyperbola $\mathrm{H} : \frac{x^2}{16} - \frac{y^2}{\lambda^2} = -1$ have the same foci. If e and L respectively denote the eccentricity and the length of the latus rectum of H, then the value of 24(e + L) is :

(A) 67
(B) 296
(C) 148
(D) 126

Answer: (B) 296 · Official NTA final key

Q8 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Let the domain of the function $f(x) = \log_3 \log_5 \log_7(9x - x^2 - 13)$ be the interval (m, n). Let the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ have eccentricity $\frac{n}{3}$ and the length of the latus rectum $\frac{8m}{3}$. Then $b^2 - a^2$ is equal to :

(A) 9
(B) 11
(C) 5
(D) 7

Answer: (D) 7 · Official NTA final key

Q9 JEE Main 2026 · 23 Jan · Shift 2 MCQ

Let PQ be a chord of the hyperbola $\frac{x^2}{4} - \frac{y^2}{b^2} = 1$, perpendicular to the x-axis such that OPQ is an equilateral triangle, O being the centre of the hyperbola. If the eccentricity of the hyperbola is $\sqrt{3}$, then the area of the triangle OPQ is

(A) $\frac{11}{5}$
(B) $\frac{9}{5}$
(C) $\frac{8\sqrt{3}}{5}$
(D) $2\sqrt{3}$

Answer: (C) $\frac{8\sqrt{3}}{5}$ · Official NTA final key

Q10 JEE Main 2026 · 22 Jan · Shift 1 MCQ

If the line $\alpha x + 2y = 1$, where $\alpha \in \mathbb{R}$, does not meet the hyperbola $x^2 - 9y^2 = 9$, then a possible value of α is:

(A) 0.5
(B) 0.6
(C) 0.8
(D) 0.7

Answer: (C) 0.8 · Official NTA final key

Q11 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Let $P(10, 2\sqrt{15})$ be a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, whose foci are S and S′. If the length of its latus rectum is 8, then the square of the area of Δ PSS′ is equal to :

(A) 4200
(B) 900
(C) 1462
(D) 2700

Answer: (D) 2700 · Official NTA final key

Q12 JEE Main 2026 · 21 Jan · Shift 1 MCQ

Let the foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$. If the eccentricity of the hyperbola is 5, then the length of its latus rectum is :

(A) $24\sqrt{5}$
(B) 12
(C) 16
(D) $\frac{96}{\sqrt{5}}$

Answer: (D) $\frac{96}{\sqrt{5}}$ · Official NTA final key

Q13 JEE Main 2025 · 7 Apr · Shift 1 Numerical

Consider the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ having one of its focus at P(–3, 0). If the latus ractum through its other focus subtends a right angle at P and $a^2b^2=\alpha\sqrt{2}-\beta, \alpha, \beta \in \mathbb{N}$, then $\alpha+\beta$ is _____ .

Numerical value type: the answer is a number.

Answer: 1944. · Key from source paper

Q14 JEE Main 2025 · 7 Apr · Shift 2 Numerical

Let the lengths of the transverse and conjugate axes of a hyperbola in standard form be 2a and 2b, respectively, and one focus and the corresponding directrix of this hyperbola be (–5, 0) and 5x + 9 = 0, respectively. If the product of the focal distances of a point $(\alpha, 2\sqrt{5})$ on the hyperbola is p, then 4p is equal to _____ .

Numerical value type: the answer is a number.

Answer: 189. · Key from source paper

Q15 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Let the sum of the focal distances of the point $P(4,3)$ on the hyperbola $H: \frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ be $8\sqrt{\frac{5}{3}}$. If for H, the length of the latus rectum is l and the product of the focal distances of the point P is m , then $9l^2+6m$ is equal to :

(A) 184
(B) 185
(C) 186
(D) 187

Answer: (B) 185 · Key from source paper

Q16 JEE Main 2025 · 3 Apr · Shift 1 Numerical

Let the product of the focal distances of the point $P(4, 2\sqrt{3})$ on the hyperbola $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be 32 . Let the length of the conjugate axis of H be p and the length of its latus rectum be q. Then $p^2 + q^2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 120. · Key from source paper

Q17 JEE Main 2025 · 3 Apr · Shift 2 Numerical

If the equation of the hyperbola with foci $(4, 2)$ and $(8, 2)$ is $3x^2 - y^2 - \alpha x + \beta y + \gamma = 0$, then $\alpha + \beta + \gamma$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 141. · Key from source paper

Q18 JEE Main 2025 · 2 Apr · Shift 1 MCQ

Let one focus of the hyperbola $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be at $(\sqrt{10}, 0)$ and the corresponding directrix be $x = \frac{9}{\sqrt{10}}$. If e and l respectively are the eccentricity and the length of the latus rectum of H, then $9(e^2 + l)$ is equal to :

(A) 16
(B) 12
(C) 15
(D) 14

Answer: (A) 16 · Key from source paper

Q19 JEE Main 2025 · 28 Jan · Shift 2 MCQ

If A and B are the points of intersection of the circle $x^2 + y^2 - 8x = 0$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ and a point P moves on the line $2x - 3y + 4 = 0$, then the centroid of $\triangle$PAB lies on the line :

(A) $x + 9y = 36$
(B) $4x + 9y = 12$
(C) $6x - 9y = 20$
(D) $9x - y = 32$

Answer: (C) $6x - 9y = 20$ · Key from source paper

Q20 JEE Main 2025 · 24 Jan · Shift 2 Numerical

Let $H_1 : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $H_2 : -\frac{x^2}{A^2} + \frac{y^2}{B^2} = 1$ be two hyperbolas having length of latus rectums $15\sqrt{2}$ and $12\sqrt{5}$ respectively. Let their ecentricities be $e_1 = \sqrt{\frac{5}{2}}$ and e_2 respectively. If the product of the lengths of their transverse axes is $100\sqrt{10}$, then $25e_2^2$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 55. · Key from source paper

Q21 JEE Main 2025 · 23 Jan · Shift 1 Numerical

Let the circle C touch the line $x - y + 1 = 0$, have the centre on the positive x -axis, and cut off a chord of length $\frac{4}{\sqrt{13}}$ along the line $-3x + 2y = 1$. Let H be the hyperbola $\frac{x^2}{\alpha^2} - \frac{y^2}{\beta^2} = 1$, whose one of the foci is the centre of C and the length of the transverse axis is the diameter of C. Then $2\alpha^2 + 3\beta^2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 19. · Key from source paper

Q22 JEE Main 2025 · 22 Jan · Shift 1 MCQ

Let the foci of a hyperbola be $(1, 14)$ and $(1, -12)$. If it passes through the point $(1, 6)$, then the length of its latus-rectum is :

(A) $\frac{24}{5}$
(B) $\frac{25}{6}$
(C) $\frac{144}{5}$
(D) $\frac{288}{5}$

Answer: (D) $\frac{288}{5}$ · Key from source paper

Q23 JEE Main 2025 · 22 Jan · Shift 2 MCQ

Let E : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, a > b and H : $\frac{x^2}{A^2} - \frac{y^2}{B^2} = 1$. Let the distance between the foci of E and the foci of H be $2\sqrt{3}$. If $a - A = 2$, and the ratio of the eccentricities of E and H is $\frac{1}{3}$, then the sum of the lengths of their latus rectums is equal to:

(A) 10
(B) 9
(C) 8
(D) 7

Answer: (C) 8 · Key from source paper

Q24 JEE Main 2024 · 9 Apr · Shift 2 MCQ

Let the foci of a hyperbola H coincide with the foci of the ellipse $E : \frac{(x-1)^2}{100} + \frac{(y-1)^2}{75} = 1$ and the eccentricity of the hyperbola H be the reciprocal of the eccentricity of the ellipse E. If the length of the transverse axis of H is α and the length of its conjugate axis is β, then $3\alpha^2 + 2\beta^2$ is equal to

(A) 237
(B) 242
(C) 205
(D) 225

Answer: (D) 225 · Key from source paper

Q25 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Let $H : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ be the hyperbola, whose eccentricity is $\sqrt{3}$ and the length of the latus rectum is $4\sqrt{3}$. Suppose the point $(\alpha, 6), \alpha > 0$ lies on H. If β is the product of the focal distances of the point $(\alpha, 6)$, then $\alpha^2 + \beta$ is equal to

(A) 172
(B) 171
(C) 169
(D) 170

Answer: (B) 171 · Key from source paper

Q26 JEE Main 2024 · 8 Apr · Shift 2 Numerical

Let S be the focus of the hyperbola $\frac{x^2}{3} - \frac{y^2}{5} = 1$, on the positive x-axis. Let C be the circle with its centre at $A(\sqrt{6}, \sqrt{5})$ and passing through the point S. If O is the origin and SAB is a diameter of C, then the square of the area of the triangle OSB is equal to _____

Numerical value type: the answer is a number.

Answer: 40. · Key from source paper

Q27 JEE Main 2024 · 6 Apr · Shift 2 Numerical

The length of the latus rectum and directrices of a hyperbola with eccentricity e are 9 and $x = \pm\frac{4}{\sqrt{13}}$, respectively. Let the line $y - \sqrt{3}x + \sqrt{3} = 0$ touch this hyperbola at (x_0, y_0). If m is the product of the focal distances of the point (x_0, y_0), then $4e^2 + m$ is equal to _____

Numerical value type: the answer is a number.

Answer: 61. · Key from source paper

Q28 JEE Main 2024 · 4 Apr · Shift 2 MCQ

Consider a hyperbola H having centre at the origin and foci on the x-axis. Let C_1 be the circle touching the hyperbola H and having the centre at the origin. Let C_2 be the circle touching the hyperbola H at its vertex and having the centre at one of its foci. If areas (in sq units) of C_1 and C_2 are 36π and 4π, respectively, then the length (in units) of latus rectum of H is

(A) $\frac{14}{3}$
(B) $\frac{28}{3}$
(C) $\frac{11}{3}$
(D) $\frac{10}{3}$

Answer: (B) $\frac{28}{3}$ · Key from source paper

Q29 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Let $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1, a>b$ be an ellipse, whose eccentricity is $\frac{1}{\sqrt{2}}$ and the length of the latus rectum is $\sqrt{14}$. Then the square of the eccentricity of $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is:

(A) 3
(B) $\frac{7}{2}$
(C) $\frac{3}{2}$
(D) $\frac{5}{2}$

Answer: (C) $\frac{3}{2}$ · Key from source paper

Q30 JEE Main 2024 · 1 Feb · Shift 1 MCQ

For $0<\theta<\pi/2$, if the eccentricity of the hyperbola $x^2-y^2\operatorname{cosec}^2\theta=5$ is $\sqrt{7}$ times eccentricity of the ellipse $x^2\operatorname{cosec}^2\theta+y^2=5$, then the value of θ is:

(A) $\frac{\pi}{6}$
(B) $\frac{5\pi}{12}$
(C) $\frac{\pi}{3}$
(D) $\frac{\pi}{4}$

Answer: (C) $\frac{\pi}{3}$ · Key from source paper

Q31 JEE Main 2024 · 31 Jan · Shift 1 MCQ

If the foci of a hyperbola are same as that of the ellipse $\frac{x^2}{9}+\frac{y^2}{25}=1$ and the eccentricity of the hyperbola is $\frac{15}{8}$ times the eccentricity of the ellipse, then the smaller focal distance of the point $\left(\sqrt{2}, \frac{14}{3}\sqrt{\frac{2}{5}}\right)$ on the hyperbola, is equal to

(A) $7\sqrt{\frac{2}{5}}-\frac{8}{3}$

(B) $14\sqrt{\frac{2}{5}}-\frac{4}{3}$

(C) $14\sqrt{\frac{2}{5}}-\frac{16}{3}$

(D) $7\sqrt{\frac{2}{5}}+\frac{8}{3}$

Answer: (A) $7\sqrt{\frac{2}{5}}-\frac{8}{3}$ · Key from source paper

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Q32 JEE Main 2024 · 31 Jan · Shift 1 Numerical

Let the foci and length of the latus rectum of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1, a>b$ be $(\pm 5,\ 0)$ and $\sqrt{50}$, respectively. Then, the square of the eccentricity of the hyperbola $\frac{x^2}{b^2}-\frac{y^2}{a^2b^2}=1$ equals

Numerical value type: the answer is a number.

Answer: 51. · Key from source paper

Q33 JEE Main 2024 · 30 Jan · Shift 1 Numerical

Let the latus rectum of the hyperbola $\frac{x^2}{9}-\frac{y^2}{b^2}=1$ subtend an angle of $\frac{\pi}{3}$ at the centre of the hyperbola. If b^2 is equal to $\frac{l}{\mathrm{m}}\left(1+\sqrt{\mathrm{n}}\right)$, where l and m are co-prime numbers, then $l^2+\mathrm{m}^2+\mathrm{n}^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 182. · Key from source paper

Q34 JEE Main 2024 · 30 Jan · Shift 2 MCQ

Let P be a point on the hyperbola $H: \frac{x^2}{9}-\frac{y^2}{4}=1$, in the first quadrant such that the area of triangle formed by P and the two foci of H is $2\sqrt{13}$. Then, the square of the distance of P from the origin is

(A) 18

(B) 26

(C) 22

(D) 20

Answer: (C) 22 · Key from source paper

Q35 JEE Main 2023 · 13 Apr · Shift 1 Numerical

Let m_1 and m_2 be the slopes of the tangents drawn from the point $P(4,1)$ to the hyperbola $H: \frac{y^2}{25}-\frac{x^2}{16}=1$. If Q is the point from which the tangents drawn to H have slopes $|m_1|$ and $|m_2|$ and they make positive intercepts α and β on the x-axis, then $\frac{(PQ)^2}{\alpha\beta}$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q36 JEE Main 2023 · 13 Apr · Shift 2 Numerical

The foci of a hyperbola are $(\pm 2, 0)$ and its eccentricity is $\frac{3}{2}$. A tangent, perpendicular to the line $2x + 3y = 6$, is drawn at a point in the first quadrant on the hyperbola. If the intercepts made by the tangent on the x- and y-axes are a and b respectively, then $|6a| + |5b|$ is equal to

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q37 JEE Main 2023 · 11 Apr · Shift 1 Numerical

Let $H_n : \frac{x^2}{1+n} - \frac{y^2}{3+n} = 1$, $n \in \mathbb{N}$. Let k be the smallest even value of n such that the eccentricity of H_k is a rational number. If l is the length of the latus rectum of H_k, then $21l$ is equal to

Numerical value type: the answer is a number.

Answer: 306. · Key from source paper

Q38 JEE Main 2023 · 11 Apr · Shift 2 Numerical

Let the tangent to the parabola $y^2 = 12x$ at the point $(3,\ \alpha)$ be perpendicular to the line $2x + 2y = 3$. Then the square of distance of the point $(6,\ -4)$ from the normal to the hyperbola $\alpha^2 x^2 - 9y^2 = 9\alpha^2$ at its point $(\alpha - 1,\ \alpha + 2)$ is equal to _____

Numerical value type: the answer is a number.

Answer: 116. · Key from source paper

Q39 JEE Main 2023 · 1 Feb · Shift 2 MCQ

Let $P(x_0, y_0)$ be the point on the hyperbola $3x^2 - 4y^2 = 36$, which is nearest to the line $3x + 2y = 1$. Then $\sqrt{2}(y_0 - x_0)$ is equal to :

(A) -3
(B) 9
(C) -9
(D) 3

Answer: (C) -9 · Key from source paper

Q40 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Let H be the hyperbola, whose foci are $\left(1 \pm \sqrt{2}, 0\right)$ and eccentricity is $\sqrt{2}$. Then the length of its latus rectum is:

(A) 3
(B) $\frac{5}{2}$
(C) 2
(D) $\frac{3}{2}$

Answer: (C) 2 · Key from source paper

Q41 JEE Main 2023 · 25 Jan · Shift 1 Numerical

The vertices of a hyperbola H are $(\pm 6, 0)$ and its eccentricity is $\frac{\sqrt{5}}{2}$. Let N be the normal to H at a point in the first quadrant and parallel to the line $\sqrt{2}x + y = 2\sqrt{2}$. If d is the length of the line segment of N between H and the y-axis then d^2 is equal to _____ .

Numerical value type: the answer is a number.

Answer: 216. · Key from source paper

Q42 JEE Main 2022 · 28 Jul · Shift 2 MCQ

Let the hyperbola $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ pass through the point $(2\sqrt{2}, -2\sqrt{2})$. A parabola is drawn whose focus is same as the focus of H with positive abscissa and the directrix of the parabola passes through the other focus of H. If the length of the latus rectum of the parabola is e times the length of the latus rectum of H, where e is the eccentricity of H, then which of the following points lies on the parabola?

(A) $(2\sqrt{3}, 3\sqrt{2})$
(B) $(3\sqrt{3}, -6\sqrt{2})$
(C) $(\sqrt{3}, -\sqrt{6})$
(D) $(3\sqrt{6}, 6\sqrt{2})$

Answer: (B) $(3\sqrt{3}, -6\sqrt{2})$ · Key from source paper

Q43 JEE Main 2022 · 27 Jul · Shift 1 Numerical

An ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ passes through the vertices of the hyperbola $H : \frac{x^2}{49} - \frac{y^2}{64} = -1$. Let the major and minor axes of the ellipse E coincide with the transverse and conjugate axes of the hyperbola H. Let the product of the eccentricities of E and H be $\frac{1}{2}$. If l is the length of the latus rectum of the ellipse E, then the value of $113l$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 1552. · Key from source paper

Q44 JEE Main 2022 · 27 Jul · Shift 2 Numerical

A common tangent T to the curves $C_1 : \frac{x^2}{4} + \frac{y^2}{9} = 1$ and $C_2 : \frac{x^2}{42} - \frac{y^2}{143} = 1$ does not pass through the fourth quadrant. If T touches C_1 at (x_1, y_1) and C_2 at (x_2, y_2), then $|2x_1 + x_2|$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 20. · Key from source paper

Q45 JEE Main 2022 · 26 Jul · Shift 1 MCQ

Let the tangent drawn to the parabola $y^2 = 24x$ at the point (α, β) is perpendicular to the line $2x + 2y = 5$. Then the normal to the hyperbola $\frac{x^2}{\alpha^2} - \frac{y^2}{\beta^2} = 1$ at the point $(\alpha + 4, \beta + 4)$ does NOT pass through the point:

(A) $(25, 10)$
(B) $(20, 12)$
(C) $(30, 8)$
(D) $(15, 13)$

Answer: (D) $(15, 13)$ · Key from source paper

Q46 JEE Main 2022 · 26 Jul · Shift 2 MCQ

If the line $x - 1 = 0$, is a directrix of the hyperbola $kx^2 - y^2 = 6$, then the hyperbola passes through the point

(A) $-2\sqrt{5}, 6$
(B) $-\sqrt{5}, 3$
(C) $\sqrt{5}, -2$
(D) $2\sqrt{5}, 3\sqrt{6}$

Answer: (C) $\sqrt{5}, -2$ · Key from source paper

Q47 JEE Main 2022 · 25 Jul · Shift 1 Numerical

Let the equation of two diameters of a circle $x^2 + y^2 - 2x + 2fy + 1 = 0$ be $2px - y = 1$ and $2x + py = 4p$. Then the slope $m \in 0, \infty$ of the tangent to the hyperbola $3x^2 - y^2 = 3$ passing through the centre of the circle is equal to _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q48 JEE Main 2022 · 25 Jul · Shift 2 MCQ

Let the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{7} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{\alpha} = \frac{1}{25}$ coincide. Then the length of the latus rectum of the hyperbola is:

(A) $\frac{32}{9}$
(B) $\frac{18}{5}$
(C) $\frac{27}{4}$
(D) $\frac{27}{10}$

Answer: (D) $\frac{27}{10}$ · Key from source paper

Q49 JEE Main 2022 · 29 Jun · Shift 1 Numerical

Let $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1,\ a > 0,\ b > 0$, be a hyperbola such that the sum of lengths of the transverse and the conjugate axes is $4\left(2\sqrt{2} + \sqrt{14}\right)$. If the eccentricity H is $\frac{\sqrt{11}}{2}$, then value of $a^2 + b^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 88. · Key from source paper

Q50 JEE Main 2022 · 28 Jun · Shift 1 MCQ

Let the eccentricity of the hyperbola $H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be $\sqrt{\frac{5}{2}}$ and length of its latus rectum be $6\sqrt{2}$. If $y = 2x + c$ is a tangent to the hyperbola H, then the value of c^2 is equal to

(A) 18
(B) 20
(C) 24
(D) 32

Answer: (B) 20 · Key from source paper

Q51 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Let $a > 0,\ b > 0$. Let e and l respectively be the eccentricity and length of the latus rectum of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. Let e' and l' respectively the eccentricity and length of the latus rectum of its conjugate hyperbola. If $e^2 = \frac{11}{14}l$ and $(e')^2 = \frac{11}{8}l'$, then the value of $77a + 44b$ is equal to

(A) 100
(B) 110
(C) 120
(D) 130

Answer: (D) 130 · Key from source paper

Q52 JEE Main 2022 · 26 Jun · Shift 2 MCQ

The normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{9} = 1$ at the point $(8, 3\sqrt{3})$ on it passes through the point

(A) $(15, -2\sqrt{3})$
(B) $(9, 2\sqrt{3})$
(C) $(-1, 9\sqrt{3})$
(D) $(-1, 6\sqrt{3})$

Answer: (C) $(-1, 9\sqrt{3})$ · Key from source paper

Q53 JEE Main 2022 · 26 Jun · Shift 2 · Numerical

Let a line L_1 be tangent to the hyperbola $\frac{x^2}{16} - \frac{y^2}{4} = 1$ and let L_2 be the line passing through the origin and perpendicular to L_1. If the locus of the point of intersection of L_1 and L_2 is $(x^2 + y^2)^2 = \alpha x^2 + \beta y^2$, then $\alpha + \beta$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q54 JEE Main 2022 · 25 Jun · Shift 2 · Numerical

Let the eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be $\frac{5}{4}$. If the equation of the normal at the point $\left(\frac{8}{\sqrt{5}}, \frac{12}{5}\right)$ on the hyperbola is $8\sqrt{5}x + \beta y = \lambda$, then $\lambda - \beta$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 85. · Key from source paper

Q55 JEE Main 2022 · 24 Jun · Shift 1 · MCQ

Let $\lambda x - 2y = \mu$ be a tangent to the hyperbola $a^2x^2 - y^2 = b^2$. Then $\left(\frac{\lambda}{a}\right)^2 - \left(\frac{\mu}{b}\right)^2$ is equal to

(A) -2
(B) -4
(C) 2
(D) 4

Answer: (D) 4 · Key from source paper

Q56 JEE Main 2022 · 24 Jun · Shift 2 · Numerical

Let the hyperbola $H : \frac{x^2}{a^2} - y^2 = 1$ and the ellipse $E : 3x^2 + 4y^2 = 12$ be such that the length of latus rectum of H is equal to the length of latus rectum of E. If e_H and e_E are the eccentricities of H and E respectively, then the value of $12\left(e_H^2 + e_E^2\right)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 42. · Key from source paper

Q57 JEE Main 2021 · 27 Aug · Shift 2 Numerical

Let $P(a\sec\theta, b\tan\theta)$ and $Q(a\sec\phi, b\tan\phi)$ where $\theta+\phi=\frac{\pi}{2}$, be two points on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. If the ordinate of the point of intersection of normals at P and Q is $-k\left(\frac{a^2+b^2}{2b}\right)$, then k is equal to

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q58 JEE Main 2021 · 26 Aug · Shift 2 MCQ

The point $P\left(-2\sqrt{6}, \sqrt{3}\right)$ lies on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ having eccentricity $\frac{\sqrt{5}}{2}$. If the tangent and normal at P to the hyperbola intersect its conjugate axis at the points Q and R respectively, then QR is equal to:

(A) $4\sqrt{3}$
(B) 6
(C) $3\sqrt{6}$
(D) $6\sqrt{3}$

Answer: (D) $6\sqrt{3}$ · Key from source paper

Q59 JEE Main 2021 · 26 Aug · Shift 2 MCQ

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) $y^2(x-2)=x^3$
(B) $x^3(x-2)=y^2$
(C) $x^2(x-2)=y^3$
(D) $y^3(x-2)=x^2$

Answer: (A) $y^2(x-2)=x^3$ · Key from source paper

Q60 JEE Main 2021 · 25 Jul · Shift 1 MCQ

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

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

Answer: (A) $16x^2-9y^2+32x+36y-36=0$ · Key from source paper

Q61 JEE Main 2021 · 22 Jul · Shift 1 MCQ

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:

(A) 12
(B) -12
(C) 24
(D) -24

Answer: (D) -24 · Key from source paper

Q62 JEE Main 2021 · 18 Mar · Shift 1 Numerical

A square $ABCD$ has all its vertices on the curve $x^2y^2 = 1$. The midpoints of its sides also lie on the same curve. Then, the square of area of $ABCD$ is

Numerical value type: the answer is a number.

Answer: 80. · Key from source paper

Q63 JEE Main 2021 · 18 Mar · Shift 2 MCQ

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

(A) $4\sqrt{6}$
(B) $\sqrt{6} - 1$
(C) $\frac{7}{\sqrt{6}} - 2$
(D) $4\sqrt{6} - 1$

Answer: (C) $\frac{7}{\sqrt{6}} - 2$ · Key from source paper

Q64 JEE Main 2021 · 16 Mar · Shift 1 MCQ

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 :

(A) $\left(x^2 + y^2\right)^2 - 16x^2 + 9y^2 = 0$
(B) $\left(x^2 + y^2\right)^2 - 9x^2 + 144y^2 = 0$
(C) $\left(x^2 + y^2\right)^2 - 9x^2 - 16y^2 = 0$
(D) $\left(x^2 + y^2\right)^2 - 9x^2 + 16y^2 = 0$

Answer: (D) $\left(x^2 + y^2\right)^2 - 9x^2 + 16y^2 = 0$ · Key from source paper

Q65 JEE Main 2021 · 25 Feb · Shift 1 · Numerical

The locus of the point of intersection of the lines $\left(\sqrt{3}\right) kx + ky - 4\sqrt{3} = 0$ and $\sqrt{3}x - y - 4\left(\sqrt{3}\right) k = 0$ is a conic, whose eccentricity is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q66 JEE Main 2021 · 25 Feb · Shift 2 · MCQ

A hyperbola passes through the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ and its transverse and conjugate axes coincide with major and minor axes of the ellipse, respectively. If the product of their eccentricities is one, then the equation of the hyperbola is:

(A) $\frac{x^2}{9} - \frac{y^2}{16} = 1$

(B) $x^2 - y^2 = 9$

(C) $\frac{x^2}{9} - \frac{y^2}{25} = 1$

(D) $\frac{x^2}{9} - \frac{y^2}{4} = 1$

Answer: (A) $\frac{x^2}{9} - \frac{y^2}{16} = 1$ · Key from source paper

Q67 JEE Main 2020 · 5 Sep · Shift 2 · MCQ

If the line $y = m\,x + c$ 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?

(A) $c^2 = 369$

(B) $5m = 4$

(C) $4c^2 = 369$

(D) $8m + 5 = 0$

Answer: (C) $4c^2 = 369$ · Key from source paper

Q68 JEE Main 2020 · 4 Sep · Shift 1 · MCQ

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:

(A) $\left(\frac{9}{2}, 3\right)$

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

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

(D) $(9, 3)$

Answer: (A) $\left(\frac{9}{2}, 3\right)$ · Key from source paper

Q69 JEE Main 2020 · 3 Sep · Shift 1 MCQ

A hyperbola having the transverse axis of length, $\sqrt{2}$ has the same foci as that of the ellipse, $3x^2 + 4y^2 = 12$ then this hyperbola does not pass through which of the following points?

(A) $\left(\frac{1}{\sqrt{2}}, 0\right)$
(B) $\left(-\sqrt{\frac{3}{2}}, 1\right)$
(C) $\left(1, -\frac{1}{\sqrt{2}}\right)$
(D) $\left(\sqrt{\frac{3}{2}}, \frac{1}{\sqrt{2}}\right)$

Answer: (D) $\left(\sqrt{\frac{3}{2}}, \frac{1}{\sqrt{2}}\right)$ · Key from source paper

Q70 JEE Main 2020 · 3 Sep · Shift 2 MCQ

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 $e_1 e_2 = 1$. If α and β are the distances between the foci of the ellipse and the foci of hyperbola respectively, then the ordered pair (α, β) is equal to:

(A) $(8,\ 10)$
(B) $\left(\frac{20}{3},\ 12\right)$
(C) $(8,\ 12)$
(D) $\left(\frac{24}{5},\ 10\right)$

Answer: (A) $(8,\ 10)$ · Key from source paper

Q71 JEE Main 2020 · 2 Sep · Shift 1 MCQ

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

(A) 6
(B) 8
(C) 10
(D) 5

Answer: (A) 6 · Key from source paper

Q72 JEE Main 2020 · 2 Sep · Shift 2 MCQ

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

(A) $2\sqrt{6}$
(B) $\sqrt{30}$
(C) $\frac{2\sqrt{5}}{3}$
(D) $\frac{4\sqrt{5}}{3}$

Answer: (D) $\frac{4\sqrt{5}}{3}$ · Key from source paper

Q73 JEE Main 2020 · 8 Jan · Shift 2 MCQ

If a hyperbola passes through the point $P(10, 16)$, and it has vertices at $(\pm 6, 0)$, then the equation of the normal to it at P, is.

(A) $3x + 4y = 94$
(B) $2x + 5y = 100$
(C) $x + 2y = 42$
(D) $x + 3y = 58$

Answer: (B) $2x + 5y = 100$ · Key from source paper

Q74 JEE Main 2019 · 12 Apr · Shift 1 MCQ

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 S' denote the foci of the hyperbola where S lies on the positive x-axis then P divides SS' in a ratio:

(A) 5: 4
(B) 2: 1
(C) 13: 11
(D) 14: 13

Answer: (A) 5: 4 · Key from source paper

Q75 JEE Main 2019 · 10 Apr · Shift 1 MCQ

If a directrix of a hyperbola centered at the origin and passing through the point $\left(4, -2\sqrt{3}\right)$ is $5x = 4\sqrt{5}$ and its eccentricity is e, then:

(A) $4e^4 + 8e^2 - 35 = 0$
(B) $4e^4 - 24e^2 + 35 = 0$
(C) $4e^4 - 24e^2 + 27 = 0$
(D) $4e^4 - 12e^2 - 27 = 0$

Answer: (B) $4e^4 - 24e^2 + 35 = 0$ · Key from source paper

Q76 JEE Main 2019 · 10 Apr · Shift 2 MCQ

If $5x + 9 = 0$ is the directrix of the hyperbola $16x^2 - 9y^2 = 144$, then its corresponding focus is:

(A) $-5,\ 0$
(B) $5,\ 0$
(C) $-\frac{5}{3},\ 0$
(D) $\frac{5}{3},\ 0$

Answer: (A) $-5,\ 0$ · Key from source paper

Q77 JEE Main 2019 · 9 Apr · Shift 1 MCQ

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:

(A) $\frac{\sqrt{5}}{2}$
(B) $\frac{3}{\sqrt{5}}$
(C) $\frac{\sqrt{15}}{2}$
(D) $\frac{2}{\sqrt{5}}$

Answer: (D) $\frac{2}{\sqrt{5}}$ · Key from source paper

Q78 JEE Main 2019 · 8 Apr · Shift 2 MCQ

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

(A) $2x - 3y + 10 = 0$
(B) $x - 2y + 8 = 0$
(C) $3x - 2y = 0$
(D) $2x - y - 2 = 0$

Answer: (D) $2x - y - 2 = 0$ · Key from source paper

Q79 JEE Main 2019 · 12 Jan · Shift 1 MCQ

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 ?

(A) $(6,\ 5\sqrt{2})$
(B) $(-6,\ 2\sqrt{10})$
(C) $(2\sqrt{6},\ 5)$
(D) $(4,\ \sqrt{15})$

Answer: (A) $(6,\ 5\sqrt{2})$ · Key from source paper

Q80 JEE Main 2019 · 11 Jan · Shift 2 MCQ

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:

(A) $\frac{13}{12}$
(B) 2
(C) $\frac{13}{6}$
(D) $\frac{13}{8}$

Answer: (A) $\frac{13}{12}$ · Key from source paper

Q81 JEE Main 2019 · 10 Jan · Shift 1 MCQ

The equation of a tangent to the hyperbola, $4x^2 - 5y^2 = 20$, parallel to the line $x - y = 2$, is

(A) $x - y + 7 = 0$
(B) $x - y - 3 = 0$
(C) $x - y + 1 = 0$
(D) $x - y + 9 = 0$

Answer: (C) $x - y + 1 = 0$ · Key from source paper

Q82 JEE Main 2019 · 9 Jan · Shift 1 MCQ

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:

(A) $3, \infty$
(B) $1, \frac{3}{2}$
(C) $2, 3$
(D) $\frac{3}{2}, 2$

Answer: (A) $3, \infty$ · Key from source paper

Q83 JEE Main 2019 · 9 Jan · Shift 2 MCQ

A hyperbola has its centre at the origin, passes through the point $(4,\ 2)$ and has transverse axis of length 4 along the $x-$ axis. Then the eccentricity of the hyperbola is:

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(A) $\sqrt{3}$
(B) $\frac{3}{2}$
(C) $\frac{2}{\sqrt{3}}$
(D) 2

Answer: (C) $\frac{2}{\sqrt{3}}$ · Key from source paper

Q84 JEE Main 2018 · 16 Apr · Online MCQ

The locus of the point of intersection of the lines $\sqrt{2}x - y + 4\sqrt{2}k = 0$ and $\sqrt{2}kx + ky - 4\sqrt{2} = 0$ (k is any non-zero real parameter) is

(A) an ellipse whose eccentricity is $\frac{1}{\sqrt{3}}$
(B) a hyperbola whose eccentricity is $\sqrt{3}$
(C) a hyperbola with length of its transverse axis $8\sqrt{2}$
(D) an ellipse with length of its major axis $8\sqrt{2}$

Answer: (C) a hyperbola with length of its transverse axis $8\sqrt{2}$ · Key from source paper

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Q85 JEE Main 2018 · 15 Apr · Shift 1 MCQ

If the tangents drawn to the hyperbola $4y^2 = x^2 + 1$ intersect the co-ordinate axes at the distinct points A and B, then the locus of the mid point of AB is

(A) $x^2 - 4y^2 + 16x^2y^2 = 0$
(B) $4x^2 - y^2 + 16x^2y^2 = 0$
(C) $4x^2 - y^2 - 16x^2y^2 = 0$
(D) $x^2 - 4y^2 - 16x^2y^2 = 0$

Answer: (D) $x^2 - 4y^2 - 16x^2y^2 = 0$ · Key from source paper

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Q86 JEE Main 2018 · 15 Apr · Shift 2 MCQ

A normal to the hyperbola, $4x^2 - 9y^2 = 36$ meets the co-ordinate axes x and y at A and B, respectively. If the parallelogram $OABP$(O being the origin) is formed, then the locus of P is

(A) $4x^2 - 9y^2 = 121$
(B) $4x^2 + 9y^2 = 121$
(C) $9x^2 - 4y^2 = 169$
(D) $9x^2 + 4y^2 = 169$

Answer: (C) $9x^2 - 4y^2 = 169$ · Key from source paper

Q87 JEE Main 2018 · 8 Apr · Offline MCQ

Tangents are drawn to the hyperbola $4x^2 - y^2 = 36$ at the points P and Q. If these tangents intersect at point $T(0,\ 3)$ then the area (in sq. units) of ΔPTQ is:

(A) $36\sqrt{5}$
(B) $45\sqrt{5}$
(C) $54\sqrt{3}$
(D) $60\sqrt{3}$

Answer: (B) $45\sqrt{5}$ · Key from source paper

Q88 JEE Main 2017 · 8 Apr · Online MCQ

The locus of the point of intersection of the straight lines, $tx - 2y - 3t = 0$ and $x - 2ty + 3 = 0$ ($t \in R$), is:

(A) A hyperbola with the length of conjugate axis 3
(B) A hyperbola with eccentricity $\sqrt{5}$
(C) An ellipse with the length of major axis 6
(D) An ellipse with eccentricity $\frac{2}{\sqrt{5}}$

Answer: (A) A hyperbola with the length of conjugate axis 3 · Key from source paper

Q89 JEE Main 2017 · 2 Apr · Offline MCQ

A hyperbola passes through the point $P(\sqrt{2}, \sqrt{3})$ and has foci at $(\pm 2, 0)$. Then the tangent to this hyperbola at P also passes through the point

(A) $(3\sqrt{2}, 2\sqrt{3})$
(B) $(2\sqrt{2}, 3\sqrt{3})$
(C) $(\sqrt{3}, \sqrt{2})$
(D) $(-\sqrt{2}, -\sqrt{3})$

Answer: (B) $(2\sqrt{2}, 3\sqrt{3})$ · Key from source paper

Q90 JEE Main 2016 · 10 Apr · Online MCQ

A hyperbola whose transverse axis is along the major axis of the conic $\frac{x^2}{3} + \frac{y^2}{4} = 4$ and has vertices at the foci of the conic. If the eccentricity of the hyperbola is $\frac{3}{2}$, then which of the following points does not lie on the hyperbola ?

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(A) $(\sqrt{5}, 2\sqrt{2})$
(B) $(0, 2)$
(C) $(5, 2\sqrt{3})$
(D) $(\sqrt{10}, 2\sqrt{3})$

Answer: (C) $(5, 2\sqrt{3})$ · Key from source paper

Q91 JEE Main 2016 · 9 Apr · Online MCQ

Let a and b respectively be the semi-transverse and semi-conjugate axes of a standard hyperbola whose eccentricity satisfies the equation $9e^2 - 18e + 5 = 0$. If $S(5,\ 0)$ is a focus and $5x = 9$ is the corresponding directrix of this hyperbola, then $a^2 - b^2$ is equal to

(A) -7
(B) -5
(C) 5
(D) 7

Answer: (A) -7 · Key from source paper

Q92 JEE Main 2016 · 3 Apr · Offline MCQ

The eccentricity of the hyperbola whose length of its conjugate axis is equal to half of the distance between its foci, is

(A) $\frac{2}{\sqrt{3}}$
(B) $\sqrt{3}$
(C) $\frac{4}{3}$
(D) $\frac{4}{\sqrt{3}}$

Answer: (A) $\frac{2}{\sqrt{3}}$ · Key from source paper

Q93 JEE Main 2015 · 10 Apr · Online MCQ

An ellipse passes through the foci of the hyperbola, $9x^2 - 4y^2 = 36$ and its major and minor axes lie along the transverse and conjugate axes of the hyperbola respectively. If the product of eccentricities of the two conics is $\frac{1}{2}$, then which of the following points does not lie on the ellipse?

(A) $\left(\frac{\sqrt{39}}{2}, \sqrt{3}\right)$
(B) $\left(\frac{\sqrt{13}}{2}, \frac{\sqrt{3}}{2}\right)$
(C) $\left(\sqrt{\frac{13}{2}}, \sqrt{6}\right)$
(D) $(\sqrt{13}, 0)$

Answer: (B) $\left(\frac{\sqrt{13}}{2}, \frac{\sqrt{3}}{2}\right)$ · Key from source paper

Q94 JEE Main 2014 · 19 Apr · Online MCQ

The tangent at an extremity (in the first quadrant) of the latus rectum of the hyperbola $\frac{x^2}{4} - \frac{y^2}{5} = 1$, meets the x-axis and y-axis at A and B, respectively. Then $OA^2 - OB^2$, where O is the origin, equals

(A) $-\frac{20}{9}$

(B) $\frac{16}{9}$

(C) 4

(D) $-\frac{4}{3}$

Answer: (A) $-\frac{20}{9}$ · Key from source paper

Q95 JEE Main 2014 · 11 Apr · Online MCQ

Let $\mathrm{P}(3\sec\theta, 2\tan\theta)$ and $\mathrm{Q}(3\sec\phi, 2\tan\phi)$ where $\theta + \phi = \frac{\pi}{2}$, be two distinct points on the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$. Then the ordinate of the point of intersection of the normals at P and Q is:

(A) $\frac{11}{3}$

(B) $-\frac{11}{3}$

(C) $\frac{13}{2}$

(D) $-\frac{13}{2}$

Answer: (D) $-\frac{13}{2}$ · Key from source paper

Q96 JEE Main 2013 · 23 Apr · Online MCQ

A tangent to the hyperbola $\frac{x^2}{4} - \frac{y^2}{2} = 1$ meets x-axis at P and y-axis at Q. Lines PR and QR are drawn such that OPRQ is a rectangle (where O is the origin). Then R lies on :

(A) $\frac{4}{x^2} + \frac{2}{y^2} = 1$

(B) $\frac{2}{x^2} - \frac{4}{y^2} = 1$

(C) $\frac{2}{x^2} + \frac{4}{y^2} = 1$

(D) $\frac{4}{x^2} - \frac{2}{y^2} = 1$

Answer: (D) $\frac{4}{x^2} - \frac{2}{y^2} = 1$ · Key from source paper

Q97 AIEEE 2012 · 19 May · Online MCQ

If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ coincide with the foci of the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$, then b^2 is equal to

(A) 8

(B) 10

(C) 7

(D) 9

Answer: (C) 7 · Key from source paper

Q98 AIEEE 2012 · 7 May · Online MCQ

If the eccentricity of a hyperbola $\frac{x^2}{9} - \frac{y^2}{b^2} = 1$, which passes through $(K, 2)$, is $\frac{\sqrt{13}}{3}$, then the value of K^2 is

(A) 18
(B) 8
(C) 1
(D) 2

Answer: (A) 18 · Key from source paper

Q99 AIEEE 2007 MCQ

For the hyperbola $\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\alpha} = 1$, which of the following remains constant when α varies?

(A) eccentricity
(B) directrix
(C) abscissae of vertices
(D) abscissae of foci

Answer: (D) abscissae of foci · Key from source paper

Q100 AIEEE 2005 MCQ

The locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = \alpha x + \beta$ is a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

(A) an ellipse
(B) a circle
(C) a parabola
(D) a hyperbola

Answer: (D) a hyperbola · Key from source paper

Q101 AIEEE 2003 MCQ

The foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide. Then the value of b^2 is

(A) 9
(B) 1
(C) 5
(D) 7

Answer: (D) 7 · Key from source paper

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