

MATHEMATICS · JEE MAIN

Ellipse

Chapter-wise previous year questions, with answer key

53

PYQS

2020–2025

PAPERS

2

TOPICS

Tangent and Normal

Standard Equation

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Tangent and Normal · 22 PYQs

Q1 JEE Main 2025 · 24 Jan · Shift 2

The equation of the chord, of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, whose mid-point is $(3, 1)$ is :

(A) $5x + 16y = 31$

(B) $48x + 25y = 169$

(C) $4x + 122y = 134$

(D) $25x + 101y = 176$

[Step-by-step solution](#) ► [prepwiser.in/questions/8411eGjq06](https://www.prepwiser.in/questions/8411eGjq06)

Q2 JEE Main 2024 · 27 Jan · Shift 1

The length of the chord of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, whose mid point is $(1, \frac{2}{5})$, is equal to :

(A) $\frac{\sqrt{1691}}{5}$

(B) $\frac{\sqrt{2009}}{5}$

(C) $\frac{\sqrt{1541}}{5}$

(D) $\frac{\sqrt{1741}}{5}$

[Step-by-step solution](#) ► [prepwiser.in/questions/xDTZQxIB1J](https://www.prepwiser.in/questions/xDTZQxIB1J)

Q3 JEE Main 2023 · 13 Apr · Shift 1

Let the tangent and normal at the point $(3\sqrt{3}, 1)$ on the ellipse $\frac{x^2}{36} + \frac{y^2}{4} = 1$ meet the y -axis at the points A and B respectively. Let the circle C be drawn taking AB as a diameter and the line $x = 2\sqrt{5}$ intersect C at the points P and Q . If the tangents at the points P and Q on the circle intersect at the point (α, β) , then $\alpha^2 - \beta^2$ is equal to :

(A) 61

(B) $\frac{304}{5}$

(C) 60

(D) $\frac{314}{5}$

[Step-by-step solution](#) ► [prepwiser.in/questions/6s3RneZf33](https://www.prepwiser.in/questions/6s3RneZf33)

Q4 JEE Main 2023 · 10 Apr · Shift 2

Let a circle of radius 4 be concentric to the ellipse $15x^2 + 19y^2 = 285$. Then the common tangents are inclined to the minor axis of the ellipse at the angle :

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{3}$

(C) $\frac{\pi}{6}$

(D) $\frac{\pi}{12}$

[Step-by-step solution](#) ► [prepwiser.in/questions/Lzi8OC57J0](https://www.prepwiser.in/questions/Lzi8OC57J0)

Q5 JEE Main 2023 · 1 Feb · Shift 2

The line $x = 8$ is the directrix of the ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with the corresponding focus $(2, 0)$. If the tangent to E at the point P in the first quadrant passes through the point $(0, 4\sqrt{3})$ and intersects the x -axis at Q , then $(3PQ)^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/KuKjJwEFWY](https://www.prepwiser.in/questions/KuKjJwEFWY)

Q6 JEE Main 2023 · 31 Jan · Shift 1

If the maximum distance of normal to the ellipse $\frac{x^2}{4} + \frac{y^2}{b^2} = 1, b < 2$, from the origin is 1, then the eccentricity of the ellipse is :

(A) $\frac{\sqrt{3}}{4}$

(B) $\frac{1}{2}$

(C) $\frac{1}{\sqrt{2}}$

(D) $\frac{\sqrt{3}}{2}$

[Step-by-step solution](#) ► [prepwiser.in/questions/D57o56Wh1Z](https://www.prepwiser.in/questions/D57o56Wh1Z)

Q7 JEE Main 2023 · 24 Jan · Shift 1

Let a tangent to the curve $9x^2 + 16y^2 = 144$ intersect the coordinate axes at the points A and B. Then, the minimum length of the line segment AB is _____

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/kZrb1VKfII](https://www.prepwiser.in/questions/kZrb1VKfII)

Q8 JEE Main 2022 · 28 Jul · Shift 1

For the hyperbola $H : x^2 - y^2 = 1$ and the ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a > b > 0$, let the

(1) eccentricity of E be reciprocal of the eccentricity of H, and

(2) the line $y = \sqrt{\frac{5}{2}}x + K$ be a common tangent of E and H.

Then $4(a^2 + b^2)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/u6DTpjZvsg](https://www.prepwiser.in/questions/u6DTpjZvsg)

Q9 JEE Main 2022 · 28 Jul · Shift 2

Let the tangents at the points P and Q on the ellipse $\frac{x^2}{2} + \frac{y^2}{4} = 1$ meet at the point $R(\sqrt{2}, 2\sqrt{2} - 2)$. If S is the focus of the ellipse on its negative major axis, then $SP^2 + SQ^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/3WQkaJGI6](https://www.prepwiser.in/questions/3WQkaJGI6)

Q10 JEE Main 2022 · 27 Jul · Shift 2

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 answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/CgafuRi_-P](https://www.prepwiser.in/questions/CgafuRi_-P)

Q11 JEE Main 2022 · 26 Jul · Shift 2

The acute angle between the pair of tangents drawn to the ellipse $2x^2 + 3y^2 = 5$ from the point $(1, 3)$ is :

- (A) $\tan^{-1} \left(\frac{16}{7\sqrt{5}} \right)$
- (B) $\tan^{-1} \left(\frac{24}{7\sqrt{5}} \right)$
- (C) $\tan^{-1} \left(\frac{32}{7\sqrt{5}} \right)$
- (D) $\tan^{-1} \left(\frac{3+8\sqrt{5}}{35} \right)$

[Step-by-step solution ► prepwiser.in/questions/GpL1I5osrp](https://www.prepwiser.in/questions/GpL1I5osrp)

Q12 JEE Main 2022 · 26 Jun · Shift 2

If m is the slope of a common tangent to the curves $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and $x^2 + y^2 = 12$, then $12m^2$ is equal to :

- (A) 6
- (B) 9
- (C) 10
- (D) 12

[Step-by-step solution ► prepwiser.in/questions/9pDOQIuAqi](https://www.prepwiser.in/questions/9pDOQIuAqi)

Q13 JEE Main 2021 · 1 Sep · Shift 2

Let θ be the acute angle between the tangents to the ellipse $\frac{x^2}{9} + \frac{y^2}{1} = 1$ and the circle $x^2 + y^2 = 3$ at their point of intersection in the first quadrant. Then $\tan\theta$ is equal to :

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

Step-by-step solution ► [prepwiser.in/questions/Njj1q49eq5](https://www.prepwiser.in/questions/Njj1q49eq5)

Q14 JEE Main 2021 · 31 Aug · Shift 1

The line $12x \cos \theta + 5y \sin \theta = 60$ is tangent to which of the following curves?

- (A) $x^2 + y^2 = 169$
(B) $144x^2 + 25y^2 = 3600$
(C) $25x^2 + 12y^2 = 3600$
(D) $x^2 + y^2 = 60$

Step-by-step solution ► [prepwiser.in/questions/nvuRFkbP_I](https://www.prepwiser.in/questions/nvuRFkbP_I)

Q15 JEE Main 2021 · 18 Mar · Shift 2

Let a tangent be drawn to the ellipse $\frac{x^2}{27} + y^2 = 1$ at $(3\sqrt{3} \cos \theta, \sin \theta)$ where $0 \in (0, \frac{\pi}{2})$. Then the value of θ such that the sum of intercepts on axes made by this tangent is minimum is equal to :

- (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$
(C) $\frac{\pi}{8}$ (D) $\frac{\pi}{4}$

Step-by-step solution ► [prepwiser.in/questions/j1KfmzX56U](https://www.prepwiser.in/questions/j1KfmzX56U)

Q16 JEE Main 2021 · 26 Feb · Shift 2

Let L be a common tangent line to the curves

$$4x^2 + 9y^2 = 36 \text{ and } (2x)^2 + (2y)^2 = 31. \text{ Then the}$$

square of the slope of the line L is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/X5ujgpEci7](https://www.prepwiser.in/questions/X5ujgpEci7)

Q17 JEE Main 2021 · 25 Feb · Shift 1

If the curves, $\frac{x^2}{a} + \frac{y^2}{b} = 1$ and $\frac{x^2}{c} + \frac{y^2}{d} = 1$ intersect each other at an angle of 90° , then which of the following relations is TRUE?

- (A) $a - c = b + d$ (B) $a + b = c + d$
(C) $ab = \frac{c+d}{a+b}$ (D) $a - b = c - d$

Step-by-step solution ► [prepwiser.in/questions/WtAGyLSjH8](https://www.prepwiser.in/questions/WtAGyLSjH8)

Q18 JEE Main 2020 · 6 Sep · Shift 2

If the normal at an end of a latus rectum of an ellipse passes through an extremity of the minor axis, then the eccentricity e of the ellipse satisfies :

- (A) $e^4 + 2e^2 - 1 = 0$
- (B) $e^4 + e^2 - 1 = 0$
- (C) $e^2 + 2e - 1 = 0$
- (D) $e^2 + e - 1 = 0$

Step-by-step solution ► [prepwisar.in/questions/nqy93NBjVi](https://www.prepwisar.in/questions/nqy93NBjVi)

Q19 JEE Main 2020 · 4 Sep · Shift 2

Let $x = 4$ be a directrix to an ellipse whose centre is at the origin and its eccentricity is $\frac{1}{2}$. If $P(1, \beta)$, $\beta > 0$ is a point on this ellipse, then the equation of the normal to it at P is :

- (A) $4x - 3y = 2$
- (B) $8x - 2y = 5$
- (C) $7x - 4y = 1$
- (D) $4x - 2y = 1$

Step-by-step solution ► [prepwisar.in/questions/If3D6Sg9ey](https://www.prepwisar.in/questions/If3D6Sg9ey)

Q20 JEE Main 2020 · 9 Jan · Shift 2

The length of the minor axis (along y-axis) of an ellipse in the standard form is $\frac{4}{\sqrt{3}}$. If this ellipse touches the line, $x + 6y = 8$; then its eccentricity is :

- (A) $\frac{1}{3}\sqrt{\frac{11}{3}}$
- (B) $\frac{1}{2}\sqrt{\frac{5}{3}}$
- (C) $\sqrt{\frac{5}{6}}$
- (D) $\frac{1}{2}\sqrt{\frac{11}{3}}$

Step-by-step solution ► [prepwisar.in/questions/nINtMUWQxo](https://www.prepwisar.in/questions/nINtMUWQxo)

Q21 JEE Main 2020 · 8 Jan · Shift 1

Let the line $y = mx$ and the ellipse $2x^2 + y^2 = 1$ intersect at a point P in the first quadrant. If the normal to this ellipse at P meets the co-ordinate axes at $(-\frac{1}{3\sqrt{2}}, 0)$ and $(0, \beta)$, then β is equal to :

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

Step-by-step solution ► [prepwisar.in/questions/Ow6mUhjfv](https://www.prepwisar.in/questions/Ow6mUhjfv)

Q22 JEE Main 2020 · 7 Jan · Shift 2

If $3x + 4y = 12\sqrt{2}$ is a tangent to the ellipse

$\frac{x^2}{a^2} + \frac{y^2}{9} = 1$ for some $a \in \mathbb{R}$, then the distance between the foci of the ellipse is :

- (A) $2\sqrt{5}$
- (B) $2\sqrt{7}$
- (C) 4
- (D) $2\sqrt{2}$

Step-by-step solution ► [prepwisar.in/questions/fY3LgXjZE6](https://www.prepwisar.in/questions/fY3LgXjZE6)

Q23 JEE Main 2025 · 8 Apr · Shift 2

Let the ellipse $3x^2 + py^2 = 4$ pass through the centre C of the circle $x^2 + y^2 - 2x - 4y - 11 = 0$ of radius r . Let f_1, f_2 be the focal distances of the point C on the ellipse. Then $6f_1f_2 - r$ is equal to

- (A) 78
- (B) 68
- (C) 70
- (D) 74

Step-by-step solution ► prepwiser.in/questions/m5yRfZJ0gC

Q24 JEE Main 2025 · 7 Apr · Shift 2

Let e_1 and e_2 be the eccentricities of the ellipse $\frac{x^2}{b^2} + \frac{y^2}{25} = 1$ and the hyperbola $\frac{x^2}{16} - \frac{y^2}{b^2} = 1$, respectively. If $b < 5$ and $e_1e_2 = 1$, then the eccentricity of the ellipse having its axes along the coordinate axes and passing through all four foci (two of the ellipse and two of the hyperbola) is :

- (A) $\frac{4}{5}$
- (B) $\frac{3}{5}$
- (C) $\frac{\sqrt{7}}{4}$
- (D) $\frac{\sqrt{3}}{2}$

Step-by-step solution ► prepwiser.in/questions/7prBTNQUO-

Q25 JEE Main 2025 · 7 Apr · Shift 2

Let the length of a latus rectum of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ be 10. If its eccentricity is the minimum value of the function $f(t) = t^2 + t + \frac{11}{12}$, $t \in \mathbb{R}$, then $a^2 + b^2$ is equal to :

- (A) 115
- (B) 120
- (C) 125
- (D) 126

Step-by-step solution ► prepwiser.in/questions/zfE1zzjIR0

Q26 JEE Main 2025 · 4 Apr · Shift 1

The length of the latus-rectum of the ellipse, whose foci are $(2, 5)$ and $(2, -3)$ and eccentricity is $\frac{4}{5}$, is

- (A) $\frac{50}{3}$
- (B) $\frac{18}{5}$
- (C) $\frac{6}{5}$
- (D) $\frac{10}{3}$

Step-by-step solution ► prepwiser.in/questions/JAdhdC_AIh

Q27 JEE Main 2025 · 2 Apr · Shift 2

If the length of the minor axis of an ellipse is equal to one fourth of the distance between the foci, then the eccentricity of the ellipse is :

- (A) $\frac{3}{\sqrt{19}}$
- (B) $\frac{\sqrt{3}}{16}$
- (C) $\frac{4}{\sqrt{17}}$
- (D) $\frac{\sqrt{5}}{7}$

Step-by-step solution ► prepwiser.in/questions/4Nc-eEG7GV

Q28 JEE Main 2025 · 29 Jan · Shift 1

Let the ellipse $E_1 : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b$ and $E_2 : \frac{x^2}{A^2} + \frac{y^2}{B^2} = 1, A < B$ have same eccentricity $\frac{1}{\sqrt{3}}$. Let the product of their lengths of latus rectums be $\frac{32}{\sqrt{3}}$ and the distance between the foci of E_1 be 4. If E_1 and E_2 meet at A, B, C and D, then the area of the quadrilateral ABCD equals :

- (A) $\frac{24\sqrt{6}}{5}$
- (B) $\frac{18\sqrt{6}}{5}$
- (C) $6\sqrt{6}$
- (D) $\frac{12\sqrt{6}}{5}$

[Step-by-step solution ► prepwiser.in/questions/rGKW-s8UID](https://www.prepwiser.in/questions/rGKW-s8UID)

Q29 JEE Main 2025 · 24 Jan · Shift 1

Let the product of the focal distances of the point $(\sqrt{3}, \frac{1}{2})$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a > b)$, be $\frac{7}{4}$. Then the absolute difference of the eccentricities of two such ellipses is

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

[Step-by-step solution ► prepwiser.in/questions/JHOc35Zf-Q](https://www.prepwiser.in/questions/JHOc35Zf-Q)

Q30 JEE Main 2024 · 9 Apr · Shift 1

Let $f(x) = x^2 + 9, g(x) = \frac{x}{x-9}$ and $a = f \circ g(10), b = g \circ f(3)$. If e and l denote the eccentricity and the length of the latus rectum of the ellipse $\frac{x^2}{a} + \frac{y^2}{b} = 1$, then $8e^2 + l^2$ is equal to.

- (A) 6
- (B) 12
- (C) 8
- (D) 16

[Step-by-step solution ► prepwiser.in/questions/f0V_ejN4Bw](https://www.prepwiser.in/questions/f0V_ejN4Bw)

Q31 JEE Main 2024 · 1 Feb · Shift 1

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 latusrectum 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) $\frac{5}{2}$

[Step-by-step solution ► prepwiser.in/questions/kwhJuIUNKI](https://www.prepwiser.in/questions/kwhJuIUNKI)

Q32 JEE Main 2024 · 30 Jan · Shift 1

If the length of the minor axis of an ellipse is equal to half of the distance between the foci, then the eccentricity of the ellipse is :

- (A) $\frac{1}{\sqrt{3}}$
- (B) $\frac{2}{\sqrt{5}}$
- (C) $\frac{\sqrt{3}}{2}$
- (D) $\frac{\sqrt{5}}{3}$

[Step-by-step solution ► prepwiser.in/questions/DzS8Om6IYf](https://www.prepwiser.in/questions/DzS8Om6IYf)

Q33 JEE Main 2023 · 12 Apr · Shift 1

Let

$$P\left(\frac{2\sqrt{3}}{\sqrt{7}}, \frac{6}{\sqrt{7}}\right), Q, R$$

and S be four points on the ellipse $9x^2 + 4y^2 = 36$. Let PQ and RS be mutually perpendicular and pass through the origin. If $\frac{1}{(PQ)^2} + \frac{1}{(RS)^2} = \frac{p}{q}$, where p and q are coprime, then $p + q$ is equal to :

(A) 143 (B) 147

(C) 137 (D) 157

[Step-by-step solution](#) ► [prepwiser.in/questions/t4JN4vUT-U](https://www.prepwiser.in/questions/t4JN4vUT-U)

Q34 JEE Main 2023 · 11 Apr · Shift 2

If the radius of the largest circle with centre (2,0) inscribed in the ellipse $x^2 + 4y^2 = 36$ is r , then $12r^2$ is equal to :

(A) 72 (B) 92

(C) 115 (D) 69

[Step-by-step solution](#) ► [prepwiser.in/questions/DYGI4aDTxv](https://www.prepwiser.in/questions/DYGI4aDTxv)

Q35 JEE Main 2023 · 6 Apr · Shift 2

Let the eccentricity of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is reciprocal to that of the hyperbola $2x^2 - 2y^2 = 1$. If the ellipse intersects the hyperbola at right angles, then square of length of the latus-rectum of the ellipse is _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/4qQ1kig29y](https://www.prepwiser.in/questions/4qQ1kig29y)

Q36 JEE Main 2023 · 24 Jan · Shift 1

Let C be the largest circle centred at (2, 0) and inscribed in the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$. If $(1, \alpha)$ lies on C, then $10\alpha^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/E787z9Jxk7](https://www.prepwiser.in/questions/E787z9Jxk7)

Q37 JEE Main 2022 · 29 Jul · Shift 1

Let a line L pass through the point of intersection of the lines $bx + 10y - 8 = 0$ and $2x - 3y = 0$, $b \in \mathbf{R} - \{\frac{4}{3}\}$. If the line L also passes through the point (1, 1) and touches the circle $17(x^2 + y^2) = 16$, then the eccentricity of the ellipse $\frac{x^2}{5} + \frac{y^2}{b^2} = 1$ is :

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

(C) $\frac{1}{\sqrt{5}}$ (D) $\sqrt{\frac{2}{5}}$

[Step-by-step solution](#) ► [prepwiser.in/questions/B4k8lilwa5](https://www.prepwiser.in/questions/B4k8lilwa5)

Q38 JEE Main 2022 · 27 Jul · Shift 1

If the length of the latus rectum of the ellipse $x^2 + 4y^2 + 2x + 8y - \lambda = 0$ is 4, and l is the length of its major axis, then $\lambda + l$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/ApUTvGZkwV](https://www.prepwiser.in/questions/ApUTvGZkwV)

Q39 JEE Main 2022 · 27 Jul · Shift 1

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 , respectively. 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 answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/UQSu9nx9If](https://www.prepwisser.in/questions/UQSu9nx9If)

Q40 JEE Main 2022 · 25 Jul · Shift 2

If the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ meets the line $\frac{x}{7} + \frac{y}{2\sqrt{6}} = 1$ on the x -axis and the line $\frac{x}{7} - \frac{y}{2\sqrt{6}} = 1$ on the y -axis, then the eccentricity of the ellipse is :

- (A) $\frac{5}{7}$ (B) $\frac{2\sqrt{6}}{7}$
(C) $\frac{3}{7}$ (D) $\frac{2\sqrt{5}}{7}$

[Step-by-step solution ► prepwisser.in/questions/zLDcACSpPn](https://www.prepwisser.in/questions/zLDcACSpPn)

Q41 JEE Main 2022 · 27 Jun · Shift 1

Let the eccentricity of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a > b$, be $\frac{1}{4}$. If this ellipse passes through the point $(-4\sqrt{\frac{2}{5}}, 3)$, then $a^2 + b^2$ is equal to :

- (A) 29 (B) 31
(C) 32 (D) 34

[Step-by-step solution ► prepwisser.in/questions/DvyonSIun](https://www.prepwisser.in/questions/DvyonSIun)

Q42 JEE Main 2022 · 26 Jun · Shift 1

Let the common tangents to the curves $4(x^2 + y^2) = 9$ and $y^2 = 4x$ intersect at the point Q. Let an ellipse, centered at the origin O, has lengths of semi-minor and semi-major axes equal to OQ and 6, respectively. If e and l respectively denote the eccentricity and the length of the latus rectum of this ellipse, then $\frac{l}{e^2}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/UXJ4rB_S53](https://www.prepwisser.in/questions/UXJ4rB_S53)

Q43 JEE Main 2022 · 26 Jun · Shift 2

The locus of the mid point of the line segment joining the point (4, 3) and the points on the ellipse $x^2 + 2y^2 = 4$ is an ellipse with eccentricity :

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

[Step-by-step solution ► prepwisser.in/questions/p5Y9tZsHOE](https://www.prepwisser.in/questions/p5Y9tZsHOE)

Q44 JEE Main 2022 · 25 Jun · Shift 2

The line $y = x + 1$ meets the ellipse $\frac{x^2}{4} + \frac{y^2}{2} = 1$ at two points P and Q. If r is the radius of the circle with PQ as diameter then $(3r)^2$ is equal to :

- (A) 20 (B) 12
(C) 11 (D) 8

[Step-by-step solution ► prepwisser.in/questions/VRK13gsf9s](https://www.prepwisser.in/questions/VRK13gsf9s)

Q45 JEE Main 2021 · 31 Aug · Shift 2

The locus of mid-points of the line segments joining $(-3, -5)$ and the points on the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ is :

- (A) $9x^2 + 4y^2 + 18x + 8y + 145 = 0$
- (B) $36x^2 + 16y^2 + 90x + 56y + 145 = 0$
- (C) $36x^2 + 16y^2 + 108x + 80y + 145 = 0$
- (D) $36x^2 + 16y^2 + 72x + 32y + 145 = 0$

[Step-by-step solution ► prepwiser.in/questions/e9D_4_IHyK](https://www.prepwiser.in/questions/e9D_4_IHyK)

Q46 JEE Main 2021 · 27 Aug · Shift 1

If $x^2 + 9y^2 - 4x + 3 = 0$, $x, y \in \mathbb{R}$, then x and y respectively lie in the intervals :

- (A) $[-\frac{1}{3}, \frac{1}{3}]$ and $[-\frac{1}{3}, \frac{1}{3}]$
- (B) $[-\frac{1}{3}, \frac{1}{3}]$ and $[1, 3]$
- (C) $[1, 3]$ and $[1, 3]$
- (D) $[1, 3]$ and $[-\frac{1}{3}, \frac{1}{3}]$

[Step-by-step solution ► prepwiser.in/questions/11n2aZjBhz](https://www.prepwiser.in/questions/11n2aZjBhz)

Q47 JEE Main 2021 · 25 Jul · Shift 1

Let an ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a^2 > b^2$, passes through $(\sqrt{\frac{3}{2}}, 1)$ and has eccentricity $\frac{1}{\sqrt{3}}$. If a circle, centered at focus $F(\alpha, 0)$, $\alpha > 0$, of E and radius $\frac{2}{\sqrt{3}}$, intersects E at two points P and Q , then PQ^2 is equal to :

- (A) $\frac{8}{3}$
- (B) $\frac{4}{3}$
- (C) $\frac{16}{3}$
- (D) 3

[Step-by-step solution ► prepwiser.in/questions/99uXIId2n](https://www.prepwiser.in/questions/99uXIId2n)

Q48 JEE Main 2021 · 16 Mar · Shift 2

If the points of intersections of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the circle $x^2 + y^2 = 4b$, $b > 4$ lie on the curve $y^2 = 3x^2$, then b is equal to :

- (A) 12
- (B) 10
- (C) 6
- (D) 5

[Step-by-step solution ► prepwiser.in/questions/jdyQT9V3IF](https://www.prepwiser.in/questions/jdyQT9V3IF)

Q49 JEE Main 2020 · 5 Sep · Shift 1

If the co-ordinates of two points A and B are $(\sqrt{7}, 0)$ and $(-\sqrt{7}, 0)$ respectively and

P is any point on the conic, $9x^2 + 16y^2 = 144$, then $PA + PB$ is equal to :

- (A) 8
- (B) 9
- (C) 16
- (D) 6

[Step-by-step solution ► prepwiser.in/questions/n_HQtCbVx3](https://www.prepwiser.in/questions/n_HQtCbVx3)

Q50 JEE Main 2020 · 4 Sep · Shift 1

Let $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ ($a > b$) be a given ellipse, length of whose latus rectum is 10. If its eccentricity is the maximum value of the function,

$\phi(t) = \frac{5}{12} + t - t^2$, then $a^2 + b^2$ is equal to :

(A) 145

(B) 126

(C) 135

(D) 116

[Step-by-step solution ► prepwiser.in/questions/Nbkxr6LTJk](https://www.prepwiser.in/questions/Nbkxr6LTJk)

Q51 JEE Main 2020 · 2 Sep · Shift 2

For some $\theta \in (0, \frac{\pi}{2})$, 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) $\sqrt{30}$

(B) $2\sqrt{6}$

(C) $\frac{4\sqrt{5}}{3}$

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

[Step-by-step solution ► prepwiser.in/questions/iiBm-YLiw2](https://www.prepwiser.in/questions/iiBm-YLiw2)

Q52 JEE Main 2020 · 9 Jan · Shift 1

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 :

(A) 17

(B) 16

(C) 15

(D) 14

[Step-by-step solution ► prepwiser.in/questions/r2NAf1rYHA](https://www.prepwiser.in/questions/r2NAf1rYHA)

Q53 JEE Main 2020 · 7 Jan · Shift 1

If the distance between the foci of an ellipse is 6 and the distance between its directrices is 12, then the length of its latus rectum is :

(A) $\sqrt{3}$

(B) $3\sqrt{2}$

(C) $\frac{3}{\sqrt{2}}$

(D) $2\sqrt{3}$

[Step-by-step solution ► prepwiser.in/questions/iwWE8sfYEX](https://www.prepwiser.in/questions/iwWE8sfYEX)

Answer key — Ellipse

Numbers match the question numbers above. For full working, open the solution link under each question.

1	B	2	A	3	B	4	B	5	39	6	D	7	7	8	3
9	13	10	20	11	B	12	B	13	B	14	B	15	A	16	3
17	D	18	B	19	D	20	D	21	A	22	B	23	C	24	B
25	D	26	B	27	C	28	A	29	C	30	C	31	C	32	B
33	D	34	B	35	2	36	118	37	B	38	75	39	1552	40	A
41	B	42	4	43	C	44	A	45	C	46	D	47	C	48	A
49	A	50	B	51	C	52	B	53	B						

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