

JEE MAIN CONIC SECTIONS — ELLIPSE: STANDARD EQUATION, ECCENTRICITY, LATUS RECTUM — PYQS

Max. Marks: 80
Questions: 20

Section A (MCQ) — 18 questions

- Q.1** Let $\frac{x^2}{f(a^2 + 7a + 3)} + \frac{y^2}{f(3a + 15)} = 1$ represent an ellipse with major axis along y-axis, where f is a strictly decreasing positive function on $\mathbb{R}$. If the set of all possible values of a is $\mathbb{R} - [\alpha, \beta]$, then $\alpha^2 + \beta^2$ is equal to : [JEE Main 2026 (Online) 8th April Evening Shift]
- (1) 28 (2) 40 (3) 61 (4) 24

Scan or tap for the full solution



- Q.2** Let a focus of the ellipse $E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ be $S(4, 0)$ and its eccentricity be $\frac{4}{5}$. If the point $P(3, \alpha)$ lies on E and O is the origin, then the area of ΔPOS is equal to: [JEE Main 2026 (Online) 5th April Morning Shift]
- (1) $\frac{12}{5}$ (2) $\frac{14}{5}$ (3) $\frac{24}{5}$ (4) $\frac{48}{5}$

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- Q.3** Let an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a < b$, pass through the point $(4, 3)$ and have eccentricity $\frac{\sqrt{5}}{3}$. Then the length of its latus rectum is : [JEE Main 2026 (Online) 2nd April Morning Shift]
- (1) $\frac{4\sqrt{5}}{3}$ (2) $2\sqrt{5}$ (3) $\frac{7\sqrt{5}}{3}$ (4) $\frac{8\sqrt{5}}{3}$

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- Q.4** An ellipse has its center at $(1, -2)$, one focus at $(3, -2)$ and one vertex at $(5, -2)$. Then the length of its latus rectum is : [JEE Main 2026 (Online) 28th January Evening Shift]
- (1) 6 (2) $6\sqrt{3}$ (3) $\frac{16}{\sqrt{3}}$ (4) $4\sqrt{3}$

Scan or tap for the full solution



- Q.5** Let each of the two ellipses $E_1: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, ($a > b$) and $E_2: \frac{x^2}{A^2} + \frac{y^2}{B^2} = 1$, ($A < B$) have eccentricity $\frac{4}{5}$. Let the lengths of the latus recta of E_1 and E_2 be l_1 and l_2 , respectively, such that $2l_1^2 = 9l_2$. If the distance between the foci of E_1 is 8, then the distance between the foci of E_2 is

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) $\frac{96}{5}$ (2) $\frac{8}{5}$ (3) $\frac{16}{5}$ (4) $\frac{32}{5}$

Scan or tap for the full solution



- Q.6** Let the length of the latus rectum of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, ($a > b$), be 30. If its eccentricity is the maximum value of the function $f(t) = -\frac{3}{4} + 2t - t^2$, then $(a^2 + b^2)$ is equal to

[JEE Main 2026 (Online) 24th January Evening Shift]

- (1) 276 (2) 516 (3) 256 (4) 496

Scan or tap for the full solution



- Q.7** Let the line $y - x = 1$ intersect the ellipse $\frac{x^2}{2} + \frac{y^2}{1} = 1$ at the points A and B . Then the angle made by the line segment AB at the center of the ellipse is :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) $\pi - \tan^{-1}\left(\frac{1}{4}\right)$ (2) $\frac{\pi}{2} + \tan^{-1}\left(\frac{1}{4}\right)$
 (3) $\frac{\pi}{2} + 2\tan^{-1}\left(\frac{1}{4}\right)$ (4) $\frac{\pi}{2} - \tan^{-1}\left(\frac{1}{4}\right)$

Scan or tap for the full solution



- Q.8** Let S and S' be the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and $P(\alpha, \beta)$ be a point on the ellipse in the first quadrant. If $(SP)^2 + (S'P)^2 - SP \cdot S'P = 37$, then $\alpha^2 + \beta^2$ is equal to :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 13 (2) 15 (3) 11 (4) 17

Scan or tap for the full solution



- Q.9** 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

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) 78 (2) 68 (3) 70 (4) 74

Scan or tap for the full solution



- Q.10** 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 :

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) 115 (2) 120 (3) 125 (4) 126

Scan or tap for the full solution



- Q.11** Let p be the number of all triangles that can be formed by joining the vertices of a regular polygon P of n sides and q be the number of all quadrilaterals that can be formed by joining the vertices of P. If $p + q = 126$, then the eccentricity of the ellipse $\frac{x^2}{16} + \frac{y^2}{n} = 1$ is :

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1)
- $\frac{1}{\sqrt{2}}$
- (2)
- $\frac{1}{2}$
- (3)
- $\frac{\sqrt{7}}{4}$
- (4)
- $\frac{3}{4}$

Scan or tap for the full solution



- Q.12** The length of the latus-rectum of the ellipse, whose foci are (2, 5) and (2, -3) and eccentricity is $\frac{4}{5}$, is

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1)
- $\frac{50}{3}$
- (2)
- $\frac{18}{5}$
- (3)
- $\frac{6}{5}$
- (4)
- $\frac{10}{3}$

Scan or tap for the full solution



- Q.13** The centre of a circle C is at the centre of the ellipse $E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a > b$. Let C pass through the foci F_1 and F_2 of E such that the circle C and the ellipse E intersect at four points. Let P be one of these four points. If the area of the triangle PF_1F_2 is 30 and the length of the major axis of E is 17, then the distance between the foci of E is :

[JEE Main 2025 (Online) 4th April Evening Shift]

- (1) 12 (2) 26 (3) 13 (4)
- $\frac{13}{2}$

Scan or tap for the full solution



- Q.14** A line passing through the point $P(\sqrt{5}, \sqrt{5})$ intersects the ellipse $\frac{x^2}{36} + \frac{y^2}{25} = 1$ at A and B such that $(PA) \cdot (PB)$ is maximum. Then $5(PA^2 + PB^2)$ is equal to :

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 290 (2) 377 (3) 338 (4) 218

Scan or tap for the full solution



- Q.15** Let C be the circle of minimum area enclosing the ellipse $E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with eccentricity $\frac{1}{2}$ and foci $(\pm 2, 0)$. Let PQR be a variable triangle, whose vertex P is on the circle C and the side QR of length $2a$ is parallel to the major axis of E and contains the point of intersection of E with the negative y-axis. Then the maximum area of the triangle PQR is :

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1)
- $8(3 + \sqrt{2})$
- (2)
- $8(2 + \sqrt{3})$
-
- (3)
- $6(3 + \sqrt{2})$
- (4)
- $6(2 + \sqrt{3})$

Scan or tap for the full solution



- Q.16** If S and S' are the foci of the ellipse $\frac{x^2}{18} + \frac{y^2}{9} = 1$ and P be a point on the ellipse, then $\min(SP \cdot S'P) + \max(SP \cdot S'P)$ is equal to :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1)
- $3(6 + \sqrt{2})$
- (2)
- $3(1 + \sqrt{2})$
-
- (3) 27 (4) 9

Scan or tap for the full solution



- Q.17** 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 :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1)
- $\frac{3}{\sqrt{19}}$
- (2)
- $\frac{\sqrt{3}}{16}$
- (3)
- $\frac{4}{\sqrt{17}}$
- (4)
- $\frac{\sqrt{5}}{7}$

Scan or tap for the full solution



- Q.18** 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 :

[JEE Main 2025 (Online) 29th January Morning Shift]

(1) $\frac{24\sqrt{6}}{5}$ (2) $\frac{18\sqrt{6}}{5}$ (3) $6\sqrt{6}$ (4) $\frac{12\sqrt{6}}{5}$

Scan or tap for the
full solution



Section B (Numerical) — 2 questions

Q.19 Consider the parabola $P: y^2 = 4kx$ and the ellipse $E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. Let the line segment joining the points of intersection of P and E , be their latus rectums. If the eccentricity of E is e , then $e^2 + 2\sqrt{2}$ is equal to _____.

[JEE Main 2026 (Online) 4th April Morning Shift]

Scan or tap for the
full solution



Q.20 Let $E_1: \frac{x^2}{9} + \frac{y^2}{4} = 1$ be an ellipse. Ellipses E_i 's are constructed such that their centres and eccentricities are same as that of E_1 , and the length of minor axis of E_i is the length of major axis of E_{i+1} ($i \geq 1$). If A_i is the area of the ellipse E_i , then $\frac{5}{\pi} \left(\sum_{i=1}^{\infty} A_i \right)$, is equal to _____.

[JEE Main 2025 (Online) 28th January Morning Shift]

Scan or tap for the
full solution



ANSWER KEY

Section A (MCQ) — 18 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	3	4	1	4	4	2	1	3	4	1
Ques.	12	13	14	15	16	17	18				
Ans.	2	3	3	2	3	3	1				

Section B (Numerical) — 2 questions

Ques.	19	20									
Ans.	3	54									