MATHS

BOOKS - OBJECTIVE RD SHARMA ENGLISH

ELLIPSE

Illustration

1. Find the equation of the ellipse whose focus is $(1, 0)$, the directrix is $x + y + 1 = 0$ and eccentricity is equal to $1\sqrt{2.}$

A. $(x-1)^2 + y^2 = (x+y+1)^2$

B. $2\left|(x-1)^2 + Y^2\right| = (x+y+1)^2$

C. $4\left\{(x-1)^2 + y^2\right\} = (x+y+1)^2$

D. none of these

Answer: A

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2. The equation $\frac{x^2}{10-a}+\frac{y^2}{4-a}=1$, represents an ellipse, if

A. $a<4$

B. $a>4$

C. $4<a$

D. $a>10$

Answer: A

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3. The curve with parametric equations

$x=1+4\cos\theta, y=2+3\sin\theta.$ is

A. an ellipse

B. a parabola

C. a hyperbola

D. a circle

Answer: C

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4. The curve represented by $x = 2(\cos t + \sin t)$ and $y = 5(\cos t - \sin t)$ is

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: C

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5. A point moves so that the sum of the squares of its distances from two intersecting straight lines is constant. Prove that its locus is an ellipse.

A. a pair of straight lines

B. a parabola

C. an ellipse

D. a hyperbola

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6. Length of the major axis of the ellipse $9x^2 + 7y^2 = 63,$ is

A. 3

B. 9

C. 6

D. $2\sqrt{17}$

Answer: C

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7. The length of the axes of the conic $9x^2 + 4y^2 - 6x + 4y + 1 = 0$, are

A. $\frac{1}{2}, 9$

B. $3, \frac{2}{5}$

C. $1, \frac{2}{3}$

D. $3, 2$

Answer: C

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8. The eccentricity of the ellipse

$x^2 + 4y^2 + 8y - 2x + 1 = 0$, is

A. $\frac{\sqrt{3}}{2}$

B. $\frac{\sqrt{5}}{2}$

C. $\frac{1}{2}$

D. $\frac{1}{4}$

Answer: A

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9. If the eccentricity of two ellipse $\frac{x^2}{169}+\frac{y^2}{25}=1$ and $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ are equal, then the value of a/b is

A. $\frac{5}{11}$

B. $\frac{6}{13}$

C. $\frac{13}{5}$

D. $\frac{13}{6}$

Answer: C

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10. The curve represented by the equation $4x^2 + 16y^2 - 24x - 24x - 32y - 12 = 0$is

A. a parabola

B. a pair of stright lines

C. an ellipse with eccentricity $\frac{1}{2}$

D. an ellipse with eccentricity $\frac{\sqrt{3}}{2}$

Answer: D

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11. Find the equation if the ellipse whose axes are along the coordinate axes, vertices are $(\pm 5, 0)$ and foci at $(\pm 4, -0)$.

A. $9x^2 + 25y^2 = 1$

B. $9x^2 + 25y^2 = 225$

C. $25x^2 + 9y^2 = 225$

D. $25x^2 + 9y^2 = 1$

Answer: B

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12. Find the equation of the ellipse whose axes are along the coordinate axes, vertices are $(0, \pm 10)$ and eccentricity$e = 4/5$.

A. $36x^2 + 100y^2 = 3600$

B. $36x^2 + 100y^2 = 1$

C. $100x^2 + 36y^2 = 3600$

D. $100x^2 + 36y^2 = 1$

Answer: C

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13. If the length of the latus rectum of an ellipse is equal to half the minor axis, then its eccentricity is

A. $\frac{1}{\sqrt{2}}$

B. $\frac{\sqrt{3}}{2}$

C. $\frac{1}{2}$

D. none of these

Answer: B

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14. about to only mathematics

A. $\frac{\sqrt{5}-1}{2}$

B. $\frac{\sqrt{5}+1}{4}$

C. $\frac{\sqrt{5}-1}{4}$

D. none of these

Answer: A

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15. about to only mathematics

A. $x^2 + y^2 = a^2 + b^2$

B. $x^2 + y^2 = a^2$

C. $x^2 + y^2 = 2a^2$

D. $x^2 + y^2 = a^2 - b^2$

Answer: D

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16. The foci of the conic $25x^2 + 16y^2 - 150x = 175$ are :

A. $(0, \pm 3)$

B. $(0, \pm 2)$

C. $(3, \pm 3)$

D. $(0, \pm 1)$

Answer: C

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17. The foci of the ellipse $\frac{(x-3)^2}{36} + \frac{(y+2)^2}{16} = 1,$ are

A. $\left(3 \pm 2\sqrt{5}, 2\right)$

B. $\left(3 \pm 2\sqrt{5}, -2\right)$

C. $(3 - 2)$

D. none of these

Answer: B

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18. The vertices of the ellipse

$9x^2 + 4y^2 - 18x - 27 = 0$ are

A. $(1, \pm 2)$

B. $(1, \pm 3)$

C. $(1, \pm 4)$

D. none of these

Answer: B

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19. The equation of the ellipse , with axes parallel to the coordinates axes , whose eccentricity is $\frac{1}{3}$ and foci at (2,-2) and (2,4) is

A. $\frac{(x-1)^2}{8} + \frac{(Y-2)^2}{9} = 9$

B. $\frac{(x-2)^2}{8} + \frac{(Y-1)^2}{9} = 9$

C. $\frac{(x-1)^2}{9}+\frac{(Y-2)^2}{8}=9$

D. $\frac{(x-2)^2}{9}+\frac{(Y-2)^2}{8}=9$

Answer: B

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20. The eccentricity of an ellipse with centre at the orgin and axes along the coordinate axes , is 1/2 if one of the directrices is x=4, the equation of the ellipse is

A. $4x^2+3y^2=1$

B. $3x^2+4y^2=12$

C. $4x^2+2y^2=12$

D. $3x^2+4y^2=1$

Answer: B

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21. Find the equation of an ellipse hose axes lie along the coordinate axes, which passes through the point (-3,1) and has eccentricity equal to $\sqrt{2/5}$.

A. $3x^2 + 5y^2 - 32 = 0$

B. $5x^2 + 3y^2 - 48 - 0$

C. $3x^2 + 5y^2 - 15 = 0$

D. $5x^2 + 3y^2 - 32 = 0$

Answer: D

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22. The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point (0, 4) circumscribes the rectangle R. The eccentricity of the ellipse E_2 is $\frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

A. $\frac{\sqrt{2}}{2}$

B. $\frac{\sqrt{3}}{2}$

C. $\frac{1}{2}$

D. $\frac{3}{4}$

Answer: C

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23. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$, and having center at (0,3) is

A. $x^2+Y^2-6y=7=0$

B. $x^2+Y^2-6y+7=0$

C. $x^2+Y^2-6y-5=0$

D. $x^2+Y^2-6y-5=0$

Answer: A

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24. Determine the equations of major and minor axes of the ellipse $4(x-2y+1)^2+9(2x+y+2)^2=25$ Also, find its center, length of he latusrectum and eccentricity.

A. $6\sqrt{5}$ and $4\sqrt{5}$

B. $4\sqrt{5}$ and $6\sqrt{5}$

C. 6 and 4

D. 4 and 6

Answer: C

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25. Determine the equations of major and minor axes of the ellipse $4(x-2y+1)^2+9(2x+y+2)^2=25$ Also, find its center, length of he latusrectum and eccentricity.

A. $x - 2y + 1 = 0, 6$

B. $x - 2y + 1 = 0, 6\sqrt{5}$

C. $2x - y + 2 = 0, 6$

D. $2x - y + 2 = 0, 6\sqrt{5}$

Answer: C

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26. Find the equation of the ellipse whose axes are of length 6 and $2\sqrt{6}$ and their equations are $x - 3y + 3 = 0$ and $3x + y - 1 = 0$, respectively.

A. $2(x - 3y + 3)^2 + 3(3x + y - 1)^2 = 180$

B. $3(x - 3y + 3)^2 + 2(3x + y - 1)^2 = 180$

C. $2(x - 3y + 3)^2 + 3(3x + y - 1)^2 = 18$

D. $3(x - 3y + 3)^2 + 2(3x + y - 1)^2 = 18$

Answer: B

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27. The line passing through the extremity A of the major exis and extremity B of the minor axis of the ellipse $x^2 + 9y^2 = 9$ meets is auxiliary circle at the point M. Then the area of the triangle with vertices at A, M, and O (the origin) is (a) 31/10 (b) 29/10 (c) 21/10 (d) 27/10

A. $31/10$

B. $29/10$

C. $21/10$

D. $27/10$

Answer: D

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28. Find the eccentric angles of the extremities of the latus recta of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

A. $\tan^{-1}\left(\pm\frac{ae}{b}\right)$

B. $\tan^{-1}\left(\pm\frac{ae}{a}\right)$

C. $\tan^{-1}\left(\pm\frac{b}{ae}\right)$

D. $\tan^{-1}\left(\pm\frac{a}{ae}\right)$

Answer: C

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29. If the line lx + my +n=0 cuts the ellpse $\frac{x^2}{a^2}+\frac{Y^2}{b^2}=1$ in point eccentric angles differ by $\pi/2$, then

A. $a^2l^2+b^2m^2=2n^2$

B. $a^2l^2+b^2m^2=n^2$

C. $a^2m^2+b^2l^2=2n^2$

D. $a^2m^2 + b^2l^2 = n^2$

Answer: A

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30. P is a variable point on the ellipse with foci S_1 and S_2. If A is the area of the the triangle PS_1S_2, the maximum value of A is

A. ab

B. abe

C. $\frac{1}{2}ab$

D. $\frac{1}{2}abe$

Answer: B

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31. If the chord, joining two points whose eccentric angles are α and β, cuts the major axis ofthe ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at a distance c from the centre, then $\tan\alpha/2.\tan\beta/2$ is equal to

A. $\frac{c+a}{c-a}$

B. $\frac{c-a}{c+a}$

C. $\frac{a-c}{a+c}$

D. $\frac{a+c}{a-c}$

Answer: B

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32. If α and β are eccentric angles of the ends of a focal chord of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, then $\frac{\tan\alpha}{2}.\frac{\tan\beta}{2}$ is (A) $\frac{1-e}{1+e}$ (B) $\frac{e+1}{e-1}$ (C) $\frac{e-1}{e+1}$ (D) none of these

A. $\frac{1-e}{1+e}$

B. $\frac{e-1}{e+1}$

C. $\frac{e+1}{e-1}$

D. none of these

Answer: B

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33. If any two chords be drawn through two points on major axis of an ellipse equidistant from centre, then $\tan\left(\frac{\alpha}{2}\right)\tan\left(\frac{\beta}{2}\right)\tan\left(\frac{\gamma}{2}\right)\tan\left(\frac{\delta}{2}\right)$ = _____,

(where $\alpha, \beta, \gamma, \delta$ are ecentric angles of extremities of chords)

A. -1

B. 1

C. $\frac{a}{b}$

D. $\frac{b}{a}$

Answer: B

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34. PSQ is the focal chord of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1, a>b$, then the harmonic mean of SP and SQ is:

A. b^2/a

B. $\frac{a^2}{b}$

C. $2b^2/a$

D. $2a^2/b$

Answer: A

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35. If PSQ is a focal chord of the ellipse $16x^2+25y^2=400$ such that $SP=8$, then find the length of SQ is (a) 2 (b) 1 (c) $\frac{8}{9}$ (d) $\frac{16}{9}$

A. 1

B. 2

C. 3

D. 4

Answer: B

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36. If $SandS'$ are two foci of ellipse $16x^2 + 25y^2 = 400$ and PSQ is a focal chord such that $SP = 16,$ then find $S'Q$.

A. $44/9$

B. $54/9$

C. $64/9$

D. $74/9$

Answer: D

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37. If the line lx+my +n=0 touches the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ then

A. $a^2l^2+b^2m^2=n^2$

B. $a^2m^2+b^2l^2=n^2$

C. $a^2n^2+b^2m^2=l^2$

D. none of these

Answer: C

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38. The line x cos $\alpha+y\sin\alpha=p$ is tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. if

A. $a^2\cos^2\alpha-b^2\sin^2\alpha=p^2$

B. $a^2\sin^2\alpha+b^2\cos^2\alpha=p^2$

C. $a^2 \cos^2 \alpha + b^2 \sin^2 \alpha = p^2$

D. $a^2 \cos^2 \alpha + b^2 \sin^2 \alpha = p$

Answer: A

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39. For what value of λ touches the ellipse $9x^2 + 16y^2 = 144$.

A. ± 5

B. ± 4

C. ± 12

D. ± 3

Answer: A

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40. The equations of the tangents to the ellpise $4x^2 + 3y^2 = 5$, which are incrlined at 60° to the axis of x are

A. $y = \sqrt{3}x \pm \sqrt{\frac{65}{12}}$

B. $y = \sqrt{3}x \pm \sqrt{\frac{12}{65}}$

C. $y = \frac{x}{\sqrt{3}} \pm \sqrt{\frac{12}{65}}$

D. none of these

Answer: A

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41. Let P be a point in the first quadrant lying on the ellipse $9x^2 + 16y^2 = 144$, such that the tangent at P to the ellipse is inclined at an angle of 135° to the positive direction of x-axis. The n the coordinates of P are

A. $\left(\frac{16}{5}, \frac{9}{5}\right)$

B. $\left(\frac{\sqrt{143}}{3}, \frac{1}{4}\right)$

C. $\left(\frac{8}{9}, \frac{\sqrt{77}}{3}\right)$

D. $\left(\frac{4}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$

Answer: A

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42. The equation of the tangents to the ellipse $4x^2 + 3y^2 = 5$, which are parallel to the line y=3x+7 are

A. $y = 3x \pm \sqrt{\frac{155}{3}}$

B. $y = 3x \pm \sqrt{\frac{155}{12}}$

C. $y = 3x \pm \sqrt{\frac{95}{12}}$

D. none of these

Answer: B

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43. The product of the perpendiculars drawn from the two foci of an ellipse to the tangent at any point of the ellipse is

A. a^2

B. b^2

C. $4a^2$

D. $4b^2$

Answer: B

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44. Prove that the focus of id-points of the portion of the tamgents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ intercepted between the axes is a $a^2y^2+b^2x^2=4x^2y^2$.

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=4$

B. $\frac{a^2}{x^2}+\frac{b^2}{y^2}=4$

C. $\frac{x^2}{a^2}-\frac{v^2}{a^2}=4$

D. none of these

Answer: B

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45. If tangents are drawn to the ellipse $x^2+2y^2=2,$ then the locus of the midpoint of the intercept made by the tangents between the coordinate axes is (a) $\frac{1}{2x^2}+\frac{1}{4y^2}=1$ (b) $\frac{1}{4x^2}+\frac{1}{2y^2}=1$ (c) $\frac{x^2}{2}+y^2=1$ (d) $\frac{x^2}{4}+\frac{y^2}{2}=1$

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

B. $\frac{1}{4x^2}+\frac{1}{2y^2}=1$

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

D. $\frac{x^2}{4}+\frac{y^2}{2}=1$

Answer: A

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46. The area (in sq units) of the quadrilateral formed by the tangents at the end points of the latus rectum to the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ is

A. $\frac{2}{2}$

B. 27

C. $\frac{27}{4}$

D. 18

Answer: B

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47. Tangent is drawn to ellipse $\frac{x^2}{27}+y^2=1$ at $\left(3\sqrt{3}\cos\theta, \sin\theta\right)$ [where $\theta \in \left(0, \frac{\pi}{2}\right)\Big]$ Then the value of θ such that sum of intercepts on axes

made by this tangent is minimum is (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{8}$ (d) $\frac{\pi}{4}$

A. $\pi/3$

B. $\pi/6$

C. $\pi/8$

D. $\pi/4$

Answer: B

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48. If P and P denote the length of the perpendicular from a focus and the centre of an ellipse with semi - major axis of length a, respectively , on a tangent to the ellipse and r denotes the focal distance of the point , then

A. $ap = rp'$

B. $rp = ap'$

C. $ap = rp' + 1$

D. $ap' + rp = 1$

Answer: A

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49. Tangent at a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is drawn which cuts the coordinates axes at A and B the minimum area of the triangle OAB is (O being origin)

A. ab

B. $\frac{a^3 + b^3 + ab}{3}$

C. $a^2 + b^2$

D. $\frac{a^2 + b^2}{4}$

Answer: A

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50. How many real tangents can be drawn to the ellipse $5x^2 + 9y^2 = 32$ from the point (2,3)?

A. 2

B. 1

C. 0

D. 3

Answer: A

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51. The number of real tangents that can be drawn to the ellipse $3x^2 + 5y^2 = 32$ passing through (3,5) is

A. 0

B. 1

C. 2

D. infinite

Answer: C

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52. If the chords of contact of tangents from two poinst (x_1, y_1) and (x_2, y_2) to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are at right angles, then find the value of $\frac{x_1 x_2}{y_1 y_2}$.

A. $\frac{a^2}{b^2}$

B. $-\frac{b^2}{a^2}$

C. $-\frac{a^4}{b^4}$

D. $-\frac{b^4}{a^4}$

Answer: C

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53. An ellipse slides between two perpendicular straight lines. Then identify the locus of its center.

A. a circle

B. an ellipse

C. a parabola

D. a pair of straight lines

Answer: A

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54. If two tangents drawn to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ intersect perpendicularly at P. then the locus of P is a circle $x^2+y^2=a^2+b^2$ the circle is called

A. circle

B. director circle

C. ellipse

D. none of these

Answer: B

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55. Find the equation of the normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the positive end of the latus rectum.

A. $x + ey + e^3a = 0$

B. $x - ey - e^3a = 0$

C. $x - ey - e^2a = 0$

D. none of these

Answer: B

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56. Find the points on the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ on which the normals are parallel to the line $2x-y=1$.

A. $\left(\frac{9}{\sqrt{10}},\frac{2}{\sqrt{10}}\right)$

B. $\left(-\frac{9}{\sqrt{10}},\frac{2}{\sqrt{10}}\right)$

C. $\left(-\frac{2}{\sqrt{10}},\frac{9}{\sqrt{10}}\right)$

D. none of these

Answer: C

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57. The line lx+my=n is a normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

A. $\frac{n^2}{in^2}+\frac{b^2}{l^2}=\frac{\left(a^2-b^2\right)^2}{n^2}$

B. $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{\left(a^2-b^2\right)^2}{n^2}$

C. $\frac{n^2}{l^2}+\frac{b^2}{m^2}=\frac{\left(a^2-b^2\right)^2}{n^2}$

D. none of these

Answer: B

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58. If the normal at an end oof a lasrurectum of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ pases through one extremly of the minor axis, show that the eccentricity of the ellipse is given by $e^4+e^2-1=0$ or $e^2=\sqrt{(5)}-\frac{1}{2}$

A. $e^4-e^2+1=0$

B. $e^2-e+1=0$

C. $e^2+e+1=0$

D. $e^4+e^2-1=0$

Answer: D

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59. If the normal at any point P on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ meets the axes at G and g respectively, then find the ratio $PG:Pg$.

(a) $a:b$ (b) $a^2:b^2$ (c) $b:a$ (d) $b^2:a^2$

A. $a:b$

B. $a^2:b^2$

C. $b^2:a^2$

D. $b:a$

Answer: C

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60. about to only mathematics

A. $\frac{2}{3}$

B. $-\frac{2}{3}$

C. $\frac{3}{2}$

D. $-\frac{3}{2}$

Answer: B

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61. The eccentricity of an ellipse whose centre is at the origin is $\frac{1}{2}$. if one of its directrices is $x = -4$, then the equation of the normal to it at $\left(1, \frac{3}{2}\right)$ is: (1)$4x + 2y = 7$ (2) $x + 2y = 4$ (3) $2y - x = 2$ (4) $4x - 2y = 1$

A. $2y - x = 2$

B. $4x - 2y = 1$

C. $4x + 2y = 7$

D. $x + 2y = 4$

Answer: B

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62. The equation of chord $\frac{x^2}{36}+\frac{y^2}{9}=1$ which is bisected at (2,1) is

A. $x-2y=0$

B. $2x+y-5=0$

C. $x+2y-4=0$

D. $3x+2y-8=0$

Answer: C

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63. The middle point of chord intercepted on the line $2x-y+3=0$ by the ellipse $\frac{x^2}{10}+\frac{y^2}{6}=1$ is

A. $\left(\frac{-30}{23},\frac{9}{23}\right)$

B. $(-1,1)$

C. $(-2,-1)$

D. none of these

Answer: A

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64. The locus of mid-points of focal chords of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{ex}{a}$

B. $\frac{x^2}{a^2}-\frac{y^2}{b^2}=\frac{ex}{a}$

C. $x^2+y^2=a^2+b^2$

D. none of these

Answer: A

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65. Chords of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ are drawn through the positive end of the minor axis. Then prove that their midpoints lie on the ellipse.

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: C

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66. The locus of the mid-point of the chords $2x+3y+\lambda=0$ of the ellispe $x^2+4y^2=1$ is (λ being parameter)

A. $8x-3y=0$

B. $8x+3y=0$

C. $3x-8y=0$

D. $3x + 8y = 0$

Answer: C

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67. The locus of poles of tangents to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with respect to concentric ellipse $\frac{x^2}{\alpha^2} + \frac{y^2}{\beta^2} = 1$ is

A. $\frac{a^2x^2}{\alpha^2} + \frac{b^2y^2}{\beta^2} = 1$

B. $\frac{a^2x^2}{\alpha^2} + \frac{\beta^2y^2}{\beta^2} = 1$

C. $\frac{\alpha^2x^2}{\alpha^2} + \frac{\beta^2y^2}{\beta^2} = 1$

D. $\frac{a^2x^2}{\alpha^4} + \frac{b^2y^2}{\beta^4} = 1$

Answer: D

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68. The locus of pole of tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with respect to the parabola $y^2=4ax,$ is

A. $b^2y^2=a^2\left(x^2-a^2\right)$

B. $b^2y^2=4a^2\left(x^2+a^2\right)$

C. $b^2y^2=4a^2\left(x^2-a^2\right)$

D. $b^2y^2=4b^2\left(x^2-a^2\right)$

Answer: C

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69. If CP and CD are semi-conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1,$ then $CP^2+CD^2=$

A. $a+b$

B. a^2+b^2

C. a^2-b^2

D. $\sqrt{a^2+b^2}$

Answer: B

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70. The locus of the point of intersection of tangents at the end-points of conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, is

A. a circle

B. a parabala

C. an ellipse

D. a hyperbola

Answer: C

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71. CP and CD are conjugate diameters of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. Then the locus of mid-point of PD is (where C is centre of ellipse and P,D are adjacent points)

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=2$

B. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{2}$

C. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=4$

D. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{4}$

Answer: B

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Section I - Solved Mcqs

1. If α and β are the eccentric angles of the extremities of a focal chord of an ellipse, then prove that the eccentricity of the ellipse is $\frac{\sin\alpha+\sin\beta}{\sin(\alpha+\beta)}$

A. $\frac{\cos\alpha + \cos\beta}{\cos(\alpha - \beta)}$

B. $\frac{\sin\alpha - \sin\beta}{\sin(\alpha - \beta)}$

C. $\frac{\cos\alpha - \cos\beta}{\cos(\alpha - \beta)}$

D. $\frac{\sin\alpha + \sin\beta}{\sin(\alpha + \beta)}$

Answer: D

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2. If $\tan\alpha\tan\beta = -\frac{a^2}{b^2}$, then the chord joining two points alpha and beta on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, will subtend a right angle at

A. focus

B. centre

C. end of the major axis

D. end of the minor axis

Answer: D

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3. The locus of point of intersection of tangents to an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at two points the sum of whose eccentric angles is constant is

A. parabola

B. circle

C. ellipse

D. straight line

Answer: D

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4. The number of values of c such that the straight line $y=4x+c$ touches the curve $\frac{x^2}{4}+\frac{y^2}{1}=1$ is (a) 0 (b) 1 (c) 2 (d) infinite

A. 0

B. 1

C. 2

D. infinite

Answer: C

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5. If $P(x, y)$ is any point on the ellipse $16x^2 + 25y^2 = 400$ and $f_1 = (3, 0) F_2 = (-3, 0)$, then find the value of $PF_1 + PF_2$.

A. 8

B. 6

C. 10

D. 12

Answer: C

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6. An ellipse slides between two perpendicular straight lines. Then identify the locus of its center.

A. parabola

B. ellipse

C. hyperbola

D. circle

Answer: D

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7. The sum fo the squares of the perpendicular on any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ from two points on the mirror axis, each at a distance $\sqrt{a^2-b^2}$ from the centre, is

A. $2a^2$

B. $2b^2$

C. $a^2 + b^2$

D. $a^2 - b^2$

Answer: A

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8. If eccentric angle of a point on the ellipse $\frac{x^2}{6} + \frac{y^2}{2} = 1$, whose distance from the centre of ellipse is 2, is

A. $\pi/4$

B. $3\pi/2$

C. $5\pi/3$

D. $7\pi/6$

Answer: A

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9. If any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ intercepts equal lengths l on the axes, then find l.

A. a^2+b^2

B. $\sqrt{a^2+b^2}$

C. $\left(a^2+b^2\right)^2$

D. none of these

Answer: B

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10. The ellipse $x^24y^2=4$ is inscribed in a rectangle aligned with the coordinates axes, whicj in turn is inscribed in another ellipse that passes through the point (0,0). Then, the equation of the ellipse is

A. $x^2 + 16y^2 = 16$

B. $x^2 + 12y^2 = 16$

C. $4x^2 + 48y^2 = 48$

D. $4x^2 + 64y^2 = 48$

Answer: B

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11. A focus of an ellipse Is that the rigin. The directrix is the line x=4 and the eccentricity is 1/2. Then, the length of the semi-major axis is

A. $4/3$

B. $5/3$

C. $8/3$

D. $2/3$

Answer: C

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12. In an ellipse, the distance between its foci is 6 and minor axis is 8. Then, its eccentricity is

A. $1/2$

B. $4/5$

C. $\frac{1}{\sqrt{5}}$

D. $3/5$

Answer: D

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13. The tangent at a point $P(a\cos\varphi, b\sin\varphi)$ of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ meets its auxiliary circle at two points, the chord joining which subtends a right angle at the center. Find the eccentricity of the ellipse.

A. $\left(1+\sin^2\theta\right)^{-1/2}$

B. $\left(1+\cos^2\theta\right)^{-1/2}$

C. $\left(1+\sin^2\theta\right)$

D. $\left(1+\cos^2\theta\right)^{1/2}$

Answer: A

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14. If F_1 and F_2 be the feet of perpendicular from the foci S_1 and S_2 of an ellipse $\frac{x^2}{5}+\frac{y^2}{3}=1$ on the tangent at any point P on the ellipse then $(S_1F_1)\cdot(S_2F_2)$ is

A. 2

B. 3

C. 4

D. 5

Answer: B

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15. The area of the rectangle formed by the perpendicular from the center of the standard ellipse to the tangent and normal at its point whose eccentric angle is $\frac{\pi}{4}$, is

A. $\left(\frac{a^2-b^2}{a^2+b^2}\right)ab$

B. $\left(\frac{a^2+b^2}{a^2-b^2}\right)ab$

C. $\frac{a^2-b^2}{a^2+b^2}$

D. $\frac{a^2+b^2}{a^2}-b^2\Big)$

Answer: A

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16. Find the slope of a common tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and a concentric circle of radius r.

A. $\tan^{-1}\sqrt{\frac{r^2-b^2}{a^2-r^2}}$

B. $\sqrt{\frac{r^2-b^2}{a^2-r^2}}$

C. $\frac{r^2-b^2}{a^2-r^2}$

D. $\sqrt{\frac{a^2-r^2}{r^2-b^2}}$

Answer: B

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17. P is a variable on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with $\forall$ ' as the major axis. Find the maximum area of triangle APA'

A. ab

B. 2 ab

C. ab/2

D. none of these

Answer: A

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18. Find the equation of an ellipse the distance between the foci is 8 units and the distance between the directrices is 18 units.

A. $5x^2 - 9y^2 = 180$

B. $9x^2 + 5y^2 = 180$

C. $x^2 + 9y^2 = 180$

D. $5x^2 + 9y^2 = 180$

Answer: D

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19. The line $x = at^2$ meets the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in the real points iff

A. $|t| < 2$

B. $|t| \leq 1$

C. $|t| > t$

D. none of these

Answer: B

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20. On the ellipse $4x^2 + 9y^2 = 1$, the points at which the tangents are parallel to the line $8x = 9y$ are (a) $\left(\frac{2}{5}, \frac{1}{5}\right)$ (b) $\left(-\frac{2}{5}, \frac{1}{5}\right)$ $\left(-\frac{2}{5}, -\frac{1}{5}\right)$ (d) $\left(\frac{2}{5}, -\frac{1}{5}\right)$

A. $(2/5, 1/5)$

B. $(\pm 2/5, \pm 1/5)$

C. $(-2/5, -1/5)$

D. $\left(\pm \frac{2}{5}, \pm 1/5 \right)$

Answer: B

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21. If circumcentre of an equilateral triangle inscribed in $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, with vertices having eccentric angles $alpna, \beta, \gamma,$ respectively is (x_1, y_1) then $\sum \cos\alpha \cos\beta + \sum \sin\alpha \sin\beta =$

A. $\frac{9x_1^2}{a^2} + \frac{9y_1^2}{b^2} + \frac{3}{2}$

B. $9x_1^2 - 9y_1^2 + a^2b^2$

C. $\frac{9x_1^2}{a} + \frac{9y_1^2}{b} + 3$

D. $\frac{9x_1^2}{2a^2} + \frac{9y_1^2}{2b^2} - \frac{3}{2}$

Answer: D

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22. Find the locus of the middle points of all chords of $\frac{x^2}{4}+\frac{y^2}{9}=1$ which are at a distance of 2 units from the vertex of parabola $y^2=-8ax$.

A. $\left(\frac{x^2}{4}+\frac{y^2}{9}\right)^2=\frac{xy}{6}$

B. $\left(\frac{x^2}{4}+\frac{y^2}{9}\right)^2=4\left(\frac{x^2}{16}+\frac{y^2}{81}\right)$

C. $\left(\frac{x^2}{4}+\frac{y^2}{9}\right)^2=\frac{x^2}{9}+\frac{y^2}{4}$

D. none of these

Answer: B

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23. A point on the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ at a distance equal to the mean of lengths of the semi - major and semi-minor axis from the centre, is

A. $\left(\frac{2\sqrt{91}}{7},\frac{3\sqrt{105}}{14}\right)$

B. $\left(\frac{2\sqrt{91}}{7},\frac{-3\sqrt{91}}{14}\right)$

C. $\left(\frac{-2\sqrt{105}}{7}, \frac{-3\sqrt{91}}{14}\right)$

D. $\left(\frac{-2\sqrt{105}}{7}, \frac{\sqrt{91}}{14}\right)$

Answer: A

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24. A tangent to the ellipse $Ax^2 + 9y^2 = 36$ is cut by the tangent at the extremities of the major axis at T and T`. The circle TT' as diameter passes through the point

A. $\left(-\sqrt{5}, 0\right)$

B. $\left(\sqrt{5}, 1\right)$

C. $(0, 0)$

D. $(3, 2)$

Answer: C

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25. If C is the center and A, B are two points on the conic $4x^2 + 9y^2 - 8x - 36y + 4 = 0$ such that $\angle ACB = \frac{\pi}{2}$, then prove that $\frac{1}{CA^2} + \frac{1}{CB^2} = \frac{13}{36}$.

A. $\frac{13}{36}$

B. $\frac{36}{13}$

C. $\frac{16}{33}$

D. $\frac{33}{16}$

Answer: A

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26. Ellipses which are drawn with the same two perpendicular lines as axes and with the sum of the reciprocals of squares of the lengths of their semi-major axis and semi-minor axis equal to a constant have only

A. two points in common

B. four points in common

C. six points in common

D. eight points in common

Answer: B

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27. The eccentricity of the ellipse which meets the straight line $\frac{x}{7}+\frac{y}{2}=1$ on the x- axis and the straight line $\frac{x}{3}-\frac{y}{5}=1$ on the y-axis and whose axis lie along the axis of coordinate

A. $\frac{2\sqrt{6}}{7}$

B. $\frac{3\sqrt{2}}{7}$

C. $\frac{\sqrt{6}}{7}$

D. none of these

Answer: A

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28. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having its centre at (0,3) is

A. 4

B. 3

C. $\sqrt{12}$

D. $7/2$

Answer: A

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29. An ellipse has OB as the semi-minor axis, $FandF'$ as its foci, and $\angle FBF'$ a right angle. Then, find the eccentricity of the ellipse.

A. $\frac{1}{\sqrt{2}}$

B. $\frac{1}{2}$

C. $\frac{\sqrt{3}}{2}$

D. none of these

Answer: A

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30. The focus of an ellipse is (-1, -1) and the corresponding directrix is $x - y + 3 = 0$. If the eccentricity of the ellipse is 1/2, then the coordinates of the centre of the ellipse, are

A. (1/2, 3/2)

B. (-1/2, 3/2)

C. (-1/2, -3/2)

D. none of these

Answer: C

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31. Find the equation fo the ellipse with its centre at (1, 2) focus at (6, 2) and containing the point (4, 6).

A. $\frac{(x-1)^2}{45}+\frac{(y-2)^2}{20}=1$

B. $\frac{(x-1)^2}{20}+\frac{(y-2)^2}{45}=1$

C. $\frac{(x+1)^2}{45}+\frac{(y+2)^2}{20}=1$

D. none of these

Answer: A

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32. Tangents are drawn to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1,(a>b)$, and the circle $x^2+y^2=a^2$ at the points where a common ordinate cuts them

(on the same side of the x-axis). Then the greatest acute angle between these tangents is given by $\tan^{-1}\left(\frac{a-b}{2\sqrt{ab}}\right)$ (b) $\tan^{-1}\left(\frac{a+b}{2\sqrt{ab}}\right)$ $\tan^{-1}\left(\frac{2ab}{\sqrt{a-b}}\right)$ (d) $\tan^{-1}\left(\frac{2ab}{\sqrt{a+b}}\right)$

A. $\tan^{-1}\left(\frac{a-b}{2\sqrt{ab}}\right)$

B. $\tan^{-1}\left(\frac{a+b}{2\sqrt{ab}}\right)$

C. $\tan^{-1}\left(\frac{2ab}{\sqrt{a-b}}\right)$

D. $\tan^{-1}\left(\frac{2ab}{\sqrt{a+b}}\right)$

Answer: A

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33. The area (in sq. units) of the quadrilateral formed by the tangents at the end points of the latus rectum to the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ is (a) $\frac{27}{4}$ (b) 18 (c) $\frac{27}{2}$ (d) 27

A. $\frac{27}{4}$

B. 9

C. $\frac{27}{2}$

D. 27

Answer: D

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34. If $\alpha - \beta =$ constant, then the locus of the point of intersection of tangents at $P(a\cos\alpha, b\sin\alpha)$ and $Q(a\cos\beta, b\sin\beta)$ to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is a circle (b) a straight line an ellipse (d) a parabola

A. a circle

B. a straight line

C. an ellipse

D. a parabola

Answer: C

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35. Let S(3,4) and S (9,12) be two foci of an ellipse. If foot of the perpendicular from focus S to a tangent of the ellipse is (1,-4), then find the eccentricity of the ellipse.

A. $4/5$

B. $5/7$

C. $7/13$

D. $5/13$

Answer: D

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36. Let $SandS'$ be two foci of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. If a circle described on SS' as diameter intersects the ellipse at real and distinct

points, then the eccentricity$e$ of the ellipse satisfies (a)$e = \frac{1}{\sqrt{2}}$ (b) $e \in \left(\frac{1}{\sqrt{2}}, 1\right)$ (c) $e \in \left(0, \frac{1}{\sqrt{2}}\right)$ (d) none of these

A. $e = 1\sqrt{2}$

B. $e \in \left(1/\sqrt{2}, 1\right)$

C. $e \in \left(0, 1/\sqrt{2}\right)$

D. none of these

Answer: B

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37. The locus of the feet of the perpendicular to any tangent of an ellipse from the foci is

A. $x^2 + y^2 = b^2$

B. $x^2 + y^2 = a^2$

C. $x^2 + y^2 = a^2 + b^2$

D. none of these

Answer: B

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38. The locus of the point of intersection of tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at the points whose eccentric angles differ by $\pi/2$, is

A. $x^2+y^2=a^2$

B. $x^2+y^2=b^2$

C. $x^2+y^2=a^2+b^2$

D. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=2$

Answer: D

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39. The locus of the point of intersection of tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, which make complementary angles with x - axis, is

A. $x^2+y^2=a^2+b^2$

B. $x^2+y^2=a^2-b^2$

C. $x^2-y^2=a^2+b^2$

D. $x^2-y^2=a^2-b^2$

Answer: D

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40. Find the locus of the foot of the perpendicular drawn from the center upon any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

A. $\left(x^2-y^2\right)^2=a^2x^2+b^2y^2$

B. $\left(x^2-y^2\right)^2=a^2x^2-b^2y^2$

C. $\left(x^2+y^2\right)^2=a^2x^2+b^2y^2$

D. $\left(x^2+b^2\right)^2=a^2x^2-b^2y^2$

Answer: C

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41. about to only mathematics

A. $x^2+2\sqrt{3}y=\pm 3\sqrt{3}$

B. $x^2\pm 2\sqrt{3}y=3\pm\sqrt{3}$

C. $x^2+2\sqrt{3}y=\sqrt{3}\pm 3$

D. $x^2-2\sqrt{3}y=\pm 3\sqrt{3}$

Answer: B

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42. The locus of point of intersection of perpendicular tangents to $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and $\frac{x^2}{a^2+\lambda}+\frac{y^2}{b^2+\lambda}$ is

A. $x^2+y^2=a^2+\lambda$

B. $x^2+y^2=b^2+\lambda$

C. $x^2+y^2=a^2+b^2+\lambda$

D. $x^2+y^2=a^2+b^2$

Answer: C

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43. Let S(3,4) and S (9,12) be two foci of an ellipse. If foot of the perpendicular from focus S to a tangent of the ellipse is (1,-4), then find the eccentricity of the ellipse.

A. $3/13$

B. $4/13$

C. $5/13$

D. none of these

Answer: C

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44. The tangent at a point $P(a\cos\varphi, b\sin\varphi)$ of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ meets its auxiliary circle at two points, the chord joining which subtends a right angle at the center. Find the eccentricity of the ellipse.

A. $\frac{1}{\sqrt{1+\cos^2\theta}}$

B. $\frac{1}{\sqrt{1+\sin^2\theta}}$

C. $\sqrt{1+\cos^2\theta}$

D. $\sqrt{1+\sin^2\theta}$

Answer: B

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45. Let $d_1 and d_2$ be the length of the perpendiculars drawn from the foci $S and S'$ of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ to the tangent at any point P on the ellipse. Then, $SP : S'P =$ $d_1 : d_2$ (b) $d_2 : d_1$ $d12 : d22$ (d) $\sqrt{d_1} : \sqrt{d_2}$

A. $d_1 : d_2$

B. $d_2 : d_1$

C. d_1^2

D. none of these

Answer: A

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46. A bar of given length moves with its extremities on two fixed straight lines at right angles. Show that any point on the bar describes an ellipse.

A. circle

B. parabola

C. ellipse

D. hyperbola

Answer: C

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47. The normal at a point P on the ellipse $x^2 + 4y^2 = 16$ meets the x-axis at Q. If M is the midpoint of the line segment PQ, then the locus of M intersects the latus rectums of the given ellipse at points.

$\left(\pm \frac{\left(3\sqrt{5}\right)}{2} \pm \frac{2}{7} \right)$ (b) $\left(\pm \frac{\left(3\sqrt{5}\right)}{2} \pm \frac{\sqrt{19}}{7} \right)$ $\left(\pm 2\sqrt{3}, \pm \frac{1}{7} \right)$ (d) $\left(\pm 2\sqrt{3} \pm \frac{4\sqrt{3}}{7} \right)$

A. $\left(\pm \frac{3\sqrt{5}}{2}, \pm \frac{2}{7} \right)$

B. $\left(\pm \frac{3\sqrt{5}}{2}, \pm \frac{\sqrt{19}}{4} \right)$

C. $\left(\pm 2\sqrt{3}, \pm \frac{1}{7} \right)$

D. $\left(\pm 2\sqrt{3}, \pm \frac{4\sqrt{3}}{7} \right)$

Answer: C

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48. From a point P perpendicular tangents PQ and PR are drawn to ellipse $x^2 + 4y^2 = 4$, then locus of circumcentre of triangle PQR is

A. $x^2 + y^2 = \frac{16}{5}\left(x^2 + 4y^2\right)^2$

B. $x^2 + y^2 = \frac{5}{16}\left(x^2 + 4y^2\right)^2$

C. $x^2 + 4y^2 = \frac{16}{5}\left(x^2 + 4y^2\right)^2$

D. $x^2 + 4y^2 = \frac{5}{16}\left(x^2 + 4y^2\right)^2$

Answer: B

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49. Tangents are draw from the point P(3,4) and to the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ touching the ellipse at ponits A and B

The coordinates of A and B are, respectively,

A. (3, 0) and (0, 2)

B. $\left(\frac{-8}{5},\frac{2\sqrt{161}}{15}\right)$ and $\left(-\frac{9}{5},\frac{8}{5}\right)$

C. $\left(-\frac{8}{5},\frac{2\sqrt{161}}{15}\right)$ and $(0,2)$

D. $(3,0)$ and $\left(-\frac{9}{5},\frac{8}{5}\right)$

Answer: D

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50. Tangents are drawn from the point P(3,4) to the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ touching the ellipse at point A and B. Q. The orthocenter of the trianlge PAB is

A. $\left(5,\frac{8}{7}\right)$

B. $\left(\frac{7}{5}, \frac{25}{8}\right)$

C. $\left(\frac{11}{5}, \frac{8}{5}\right)$

D. $\left(\frac{8}{25}, \frac{7}{5}\right)$

Answer: C

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51. Tangents are drawn from the point P(3,4) to the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ touching the ellipse at point A and B. Q. The equation of the locus of the points whose distance from the point P and the line AB are equal, is

A. $9x^2 + y^2 - 6xy - 54x - 62y + 241 = 0$

B. $x^2 + 9y^2 + 6xy - 54x + 62y - 241 = 0$

C. $9x^2 + 9y^2 - 6xy - 54x - 62y - 241 = 0$

D. $x^2 + y^2 - 2xy + 27x + 31y - 120 = 0$

Answer: A

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52. A vertical line passing through the point $(h, 0)$ intersects the ellipse $\frac{x^2}{4} + \frac{y^2}{3} = 1$ at the points P and Q.Let the tangents to the ellipse at P and Q meet at R. If $\Delta(h)$ Area of triangle ΔPQR, and $\Delta_1 = \max_{\frac{1}{2} \le h \le 1} \Delta(h)$ and $\Delta_2 = \min_{\frac{1}{2} \le h \le 1} \Delta(h)$ Then $\frac{8}{\sqrt{5}}\Delta_1 - 8\Delta_2$

A. $\frac{36}{8}$

B. $\frac{45\sqrt{5}}{8}$

C. 9

D. 8

Answer: D

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53. If the normal from the point P(h,1) on the ellipse $\frac{x^2}{6} + \frac{y^2}{3} = 1$ is perpendicular to the line $x + y = 8$, then the value of h is

A. 1

B. 2

C. 8

D. 9

Answer: B

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54. the locus of the foot of perpendicular drawn from the centre of the ellipse $x^2 + 3y^2 = 6$ on any point:

A. $\left(x^2 + y^2\right)^2 = 6x^2 + 2y^2$

B. $\left(x^2 + y^2\right)^2 = 6x^2 - 2y^2$

C. $\left(x^2 - y^2\right)^2 = 6x^2 + 2y^2$

D. $\left(x^2 - y^2\right)^2 = 6x^2 - 2y^2$

Answer: A

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55. Let E_1 and E_2 be two ellipse whsoe centers are at the origin. The major axes of E_1 and E_2 lie along the x-axis , and the y-axis, respectively. Let S be the circle $x^2 + (y-1)^2 = 2$. The straigth line x+y=3 touches the curves, S, E_1 and E_2 at P,Q and R, respectively . Suppose that $PQ = PR = \frac{2\sqrt{2}}{3}$. If e_1 and e_2 are the eccentricities of E_1 and E_2 respectively, thent hecorrect expression (s) is (are)

A. $e_1^2 + e_2^2 = \frac{43}{40}$

B. $e_1 e_2 = \frac{\sqrt{7}}{2\sqrt{10}}$

C. $\left|e_1^2 - e_2^2\right| = \frac{5}{8}$

D. $e_1 e_2 = \frac{\sqrt{3}}{4}$

Answer: A::B

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56. Suppose that the foci of the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ are $(f_1,0)and(f_2,0)$ where $f_1>0andf_2<0.$ Let P_1andP_2 be two parabolas with a common vertex at (0, 0) and with foci at $(f_1.0)and$ (2f_2 , 0), respectively. LetT_1 be a tangent to P_1 which passes through $(2f_2,0)$ and T_2 be a tangents to P_2 which passes through $(f_1,0)$. If m_1 is the slope of T_1 and m_2 is the slope of $T_2,$ then the value of $\left(\frac{1}{m_1^2}+m_2^2\right)$ is

A. 2

B. 4

C. 6

D. 8

Answer: B

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57. A line intesects the ellipse $\frac{x^2}{4a^2}+\frac{y^2}{a^2}=1$ at A and B and the parabola $y^2=4a(x+2a)$ at C and D. The line segment AB substends a right angle at the centre of the ellipse. Then, the locus of the point of intersection of tangents to the parabola at C and D, is

A. $y^2-a^2=\frac{5}{4}(x-4a)^2$

B. $y^2-2a^2=10(x-4a)^2$

C. $y^2+a^2=\frac{5}{2}(x-4a)^2$

D. $y^2+4a^2=5(x+4a)^2$

Answer: D

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58. Let $F_1(x_1,0)$ and $F_2(x_2,0)$ for $x_1<0$ and $x_2>0$ the foci of the ellipse $\frac{x^2}{9}+\frac{y^2}{8}=1$. Suppose a parabola having vertex at the origin and focus at F_2 intersects the ellipse at point M in the first quadrant and at a point N in the fourth quardant. The orthocentre of the triangle F_1MN, is

A. $\left(-\frac{9}{10}, 0\right)$

B. $\left(\frac{2}{3}, 0\right)$

C. $\left(\frac{9}{10}, 0\right)$

D. $\left(\frac{9}{10}, 0\right)$

Answer: A

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59. If the tangents to the ellipse at M and N meet at R and the normal to the parabola at M meets the x-axis at Q, then the ratio of area of the triangle MQR to area of the quadrilateral MF1NF2 is

A. $3:4$

B. $4:5$

C. $5:8$

D. $2:3$

Answer: C

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Section II - Assertion Reason Type

1. Statement-1: Tangents drawn from any point on the circle $x^2 + y^2 = 25$ to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ are at right angle Statement-2: The locus of the point of intersection of perpendicular tangents to an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is its director circle $x^2 + y^2 = a^2 + b^2$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: A

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2. Statement-1: Tangents drawn from any point on the circle $x^2 + y^2 = 225$ to the ellipse $\frac{x^2}{144} + \frac{y^2}{81} = 1$ are at a right angle.

Statement -2 : Equation of the auxiliary circle of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is $x^2 + y^2 = a^2$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: B

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3. Condider the lines $L_1 : 3x + 4y = k - 12$, $L_2 : 3x + 4y = \sqrt{2}k$ and the ellipse C : $\frac{x^2}{16} + \frac{y^2}{9} = 1$ where k is any real number

Statement-1: If line L_1 is a diameter of ellipse C, then line L_2 is not a tangent to the ellipse C.

Statement-2: If L_2 is a diameter of ellipse C, L_1 is the chord joining the negative end points of the major and minor axes of C.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: D

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4. Consider the following curves:

$C_1 : x^2 + y^2 = 4, \quad C_2 : x^2 - 2\sqrt{3}y = 3, \quad C_3 + \sqrt{3}, \quad C_3 : x^2 + 2\sqrt{3}y =$

Statement-1: Parabolas C_2 and C_3 have the same latusrectum, the line joining the end -points oflatusrecla of the ellipse C_1 with negative ordinates.

Statement-2: Common chord of C_2 and C_3 is a laturectum of C_1.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: C

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5. Consider the ellipse $C: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ having its centre at the origin O and eccentricity e.

Statement-1: If the normal at an end L of a Latusrectum of the ellipse C meets the major axis at G, then $OG = ae^3$

Statement-2 : the normal at a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ never passes through its foci.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: A

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6. The tangent at a point P on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, which in not an extremely of major axis meets a directrix at T. Statement-1: The circle on PT as diameter passes through the focus of the ellipse corresponding to the directrix on which T lies.

Statement-2: Pt substends is a right angle at the focus of the ellipse corresponding to the directrix on which T lies.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: A

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7. Let C be the locus of a point the sum of whose distances from the points $S(\sqrt{3}, 0)$ and $S'(-\sqrt{3}, 0)$ is 4.

Statement-1: The curve C cuts off intercept $2\sqrt{3}$ from the line 2y-1=0

Statement-2: The equation of the centre C is $x^2 + 8y^2 = 5$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement -2 is not a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True

Answer: C

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Exercise

1. the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents an ellipse , if

A. $\Delta = 0, h^2 < ab$

B. $\Delta \neq 0, h^2 < ab$

C. $\Delta \neq 0, h^2 > ab$

D. $\Delta \neq 0, h^2 = ab$

Answer: B

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2. Find equation of the ellipse whose focus is (1,-1), then directrix the line x-y-3=0 and eccentricity $\frac{1}{2}$ is

A. $7x^2 + 2xy + 7y^2 - 10x + 10y + 7 = 0$

B. $7x^2 + 2xy + 7y^2 + 7 = 0$

C. $7x^2 + 2xy + 7y^2 + 10x - 10y - 7 - 0$

D. none of these

Answer: A

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3. Find the equation of the ellipse (referred to its axes as the axes of $xandy$, respectively) whose foci are $(\pm 2, 0)$ and eccentricity is $\frac{1}{2}$

A. $\frac{x^2}{12} + \frac{y^2}{16} = 1$

B. $\frac{x^2}{16} + \frac{y^2}{12} = 1$

C. $\frac{x^2}{16} + \frac{y^2}{8} = 1$

D. none of these

Answer: B

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4. Find the equation to the ellipse (referred to its axes as the axes of $x \; and \; y$ respectively) which passes through the point (-3,1) and has eccentricity $\sqrt{\frac{2}{5}}$

A. $3x^2 \mid 6y^2 = 33$

B. $5x^2 + 3y^2 = 48$

C. $3x^2 + 5y^2 = 32$

D. none of these

Answer: C

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5. The eccentricity of the ellipse $9x^2 + 5y^2 - 30y = 0$ is

A. $1/3$

B. $2/3$

C. $3/4$

D. none of these

Answer: B

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6. If A and B are two fixed points and P is a variable point such that $PA + PB = 4$, the locus of P is

A. A parabola

B. An ellipse

C. hy hyperbola

D. none of these

Answer: B

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7. the length of the latusrectum of the ellipse $3x^2 + y^2 = 12$. Is

A. 4

B. 3

C. 8

D. $4/\sqrt{3}$

Answer: D

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8. Find the eccentricity of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ whose latus reactum is half of its major axis.

A. $1\sqrt{2}$

B. $\sqrt{2/3}$

C. $\sqrt{3}/2$

D. none of these

Answer: A

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9. the eccentricity of an ellipse $\frac{x^2}{a^2} + \left(y^2\right) = 1$ whose latus rectum is half of its minor axes , is

A. $1/\sqrt{2}$

B. $\sqrt{2/3}$

C. $\sqrt{3}/2$

D. none of these

Answer: C

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10. If the focal distance of an end of the minor axis of an ellipse (referred to its axes as the axes of x and y, respectively) is k and the distance between its foci is $2h$, them find its equation.

A. $\frac{x^2}{k^2}+\frac{y^2}{h^2}=1$

B. $\frac{x^2}{k^2}+\frac{y^2}{k^2-h^2}=1$

C. $\frac{x^2}{k^2}+\frac{y^2}{h^2-k^2}=1$

D. $\frac{x^2}{k^2}+\frac{y^2}{k^2+h^2}=1$

Answer: B

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11. if $2y=x$ and $3y+4x=0$ are the equations of a pair of conjugate diameters of an ellipse , then the eccentricity of the ellipse , is

A. $\sqrt{2/3}$

B. $\sqrt{2/5}$

C. $\sqrt{1/3}$

D. $\sqrt{1/2}$

Answer: C

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12. if θ is a parameter then $x = a(\sin\theta + \cos\theta)$,

$y = b(\sin\theta - \cos\theta)$ respresents

A. an ellipse

B. a circle

C. a pair of stright lines

D. a hyperbola

Answer: A

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13. The distance from the foci of $P(x_1, y_1)$ on the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$ are

A. $4 \pm \frac{5}{4} y_1$

B. $5 \pm \frac{4}{5} x_1$

C. $5 \pm \frac{5}{4} y_1$

D. none of these

Answer: C

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14. Find the equation for the ellipse that satisfies the given conditions:Vertices $(\pm 5, 0)$, foci $(\pm 4, 0)$

A. $\frac{x^2}{25} + \frac{y^2}{16} = 1$

B. $9x^2 + 25y^2 = 225$

C. $\frac{x^2}{9} + \frac{y^2}{25} = 1$

D. $4x^2 + 5y^2 = 20$

Answer: B

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15. The eccentricity of the curve $x^2 - 4x + 4y^2 = 12$ is

A. $\sqrt{3}/2$

B. $2/\sqrt{3}$

C. $\sqrt{3}$

D. none of these

Answer: A

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16. The parametric representation of a point on the ellipse whose foci are (-1, 0) and (7, 0) and eccentricity 1/2, is

A. $\left(3+8\cos\theta, 4\sqrt{3}\sin\theta\right)$

B. $\left(8\cos\theta, 4\sqrt{3}\right)\sin\theta\right)$

C. $\left(3+4\sqrt{3}\cos\theta, 8\sin\theta\right)$

D. none of these

Answer: A

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17. if S and S are two foci of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $(a<b)$ and $P(x_1, y_1)$ a point on it then SP+ S'P is equal to

A. 2a

B. 2b

C. $a+ex_1$

D. $b + ey_1$

Answer: B

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18. The eccentricity of the ellipse represented by $25x^2 + 16y^2 - 150x - 175 = 0$ is

A. $2/5$

B. $3/5$

C. $4/5$

D. none of these

Answer: B

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19. the length of the latusrectum of the ellipse $5x^2 + 9x^2 = 45,$ is

A. $5/3$

B. $10/3$

C. $2\sqrt{5}/5$

D. $\sqrt{5}/3$

Answer: B

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20. The equation of the passing through the of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 9,$ and having centre at (0,3) is :

A. 4

B. 3

C. $\sqrt{12}$

D. $7/2$

Answer: A

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21. the eccentricity to the conic $4x^2 + 16y^2 - 24x - 32y = 1$ is

A. $1/2$

B. $\sqrt{3}$

C. $\sqrt{3}/2$

D. $\sqrt{3}/4$

Answer: C

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22. A set of points is such that each point is three times as far away from the y-axis as it is from the point (4,0).Then locus of the points is:

A. hyperbola

B. parabola

C. ellipse

D. circle

Answer: C

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23. the foci of an ellipse are (0 ± 6) and the equation of the directrces are $y = \pm 9$. the equation of the ellipse is

A. $5x^2 + 9x^2 = 4$

B. $2x^2 - 6y = 28$

C. $6x^2 + 3y^2 = 45$

D. $9x^2 + 5y^2 = 180$

Answer: D

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24. An ellipse has its centre at (1,-1) and semi major axis =8 and it passes through the point (1,3). The equation of the ellipse is $\frac{(x+1)^2}{64} + \frac{(y+1)^2}{16} = 1$ b. $\frac{(x-1)^2}{64} + \frac{(y-1)^2}{16} = 1$ c. $\frac{(x-1)^2}{64} + \frac{(y+1)^2}{16} = 1$ d. $\frac{(x+1)^2}{64} + \frac{(y-1)^2}{16} = 1$

A. $\frac{(x+1)^2}{64} + \frac{(y+1)^2}{16} = 1$

B. $\frac{(x-1)^2}{64} + \frac{(y+1)^2}{16} = 1$

C. $\frac{(x-1)^2}{16} + \frac{(y+1)^2}{64} = 1$

D. $\frac{(x+1)^2}{64} + \frac{(y-1)^2}{16} = 1$

Answer: B

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25. Let L L ' be the latusrectum and S be a focus of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ if $\Delta SLL'$ is equilaterial ,then the eccentricity of the ellispe ,is

A. $1/\sqrt{5})$

B. $1/\sqrt{3}$

C. $1/\sqrt{2}$

D. $\sqrt{2}/3$

Answer: B

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26. the equation of the axes of the ellispe $3x^2+4y^2+6x-8y-5=0$ are

A. $x-3, y=5$

B. $x+3=0, y-5=0$

C. $x-1=0, y=0$

D. $x+1=0, y-1=0$

Answer: D

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27. the equations to the directrices of the ellipse $4(x-3)^2+9(y+2)^2=144,$ are

A. $5x-15\pm 18\sqrt{5}=0$

B. $5x+15\pm 2\sqrt{5}=0$

C. $15x\pm 2\sqrt{5}=0$

D. $15x-5\pm 18\sqrt{5}=0$

Answer: A

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28. if the vertices of an ellipse are $(-12, 4)$ and $(14, 4)$ and eccentricity 12/13 , then the equation of the ellipse ,is

A. $\frac{(x+4)^2}{25} + \frac{(y-1)^2}{169} = 1$

B. $\frac{(x-4)^2}{169} + \frac{(y-1)^2}{25} = 1$

C. $\frac{(x-1)^2}{169} + \frac{(y-4)^2}{25} = 1$

D. $\frac{(x+1)^2}{169} + \frac{(y+4)^2}{25} = 1$

Answer: C

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29. if the coordinates of the vertices of an ellipse are (-6,1) and (4,1) and the equation of a focal chord passing through the focus on the right side of the centre is $2x - y - 5 = 0$ the equation of the elipse , is

A. $\frac{(x+1)^2}{25} + \frac{(y+1)^2}{16} = 1$

B. $\frac{(x+1)^2}{25}+\frac{(y-1)^2}{16}=1$

C. $\frac{(x-1)^2}{25}+\frac{(y+1)^2}{16}=1$

D. none of these

Answer: B

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30. if the tangent at the point $\left(4\cos\phi, \frac{16}{\sqrt{11}}\sin\phi\right)$ to the ellipse $16x^2+11y^2=256$ Is also a tangent to the circle $x^2+y^2-2x=15$, then the value of ϕ is

A. $\pm\pi/2$

B. $\pm\pi/4$

C. $\pm\pi/3$

D. $\pm\pi/6$

Answer: C

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31. A man running around a race course notes that the sum of the distances of two flagposts from him a always 10m and the distance between the flag posts is 8m. Then the area of the path he encloses in square meters is 15π (b) 20π (c) 27π (d) 30π

A. 15π

B. 12π

C. 18π

D. 8π

Answer: A

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32. Find the angle between the pair of tangents from the point (1,2) to the ellipse $3x^2 + 2y^2 = 5$.

A. $\tan^{-1}\left(\frac{12}{5}\right)$

B. $\tan^{-1}\left(\frac{6}{\sqrt{5}}\right)$

C. $\tan^{-1}\left(\frac{12}{\sqrt{5}}\right)$

D. $\tan^{-1}(12\sqrt{5})$

Answer: C

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33. Find the foci of the ellipse $25(x+1)^2+9(y+2)^2=225$.

A. $(-1,2)$ and $(-1,-6)$

B. $(-2,1)$ and $(-2,6)$

C. $(-1,-2)$ and $(-2,-1)$

D. $(-1,-2)$ and $(-1,-6)$

Answer: A

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34. if the coordinates of the centre , a foucs and adjacent vertex are $(2, -3), (3, -3)$ and $(4, -3)$ respectively , then the equation of the ellipse Is

A. $\frac{(x-2)^2}{4} + \frac{(y-3)^2}{3} = 1$

B. $\frac{(x-3)^2}{4} + \frac{(y-2)^2}{3} = 1$

C. $\frac{(x-2)^2}{8} + \frac{(y+3)^2}{6} = 1$

D. $\frac{(x+2)^2}{4} + \frac{(y+3)^2}{3} = 1$

Answer: A

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35. If $\frac{x}{a} + \frac{y}{b} = \sqrt{2}$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then find the eccentric angle θ of point of contact.

A. 0

B. $\pi/3$

C. $\pi/4$

D. $\pi/4$

Answer: B

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36. A tangent having slope of $-\frac{4}{3}$ to the ellipse $\frac{x^2}{18}+\frac{y^2}{32}=1$ intersects the major and minor axes at points A and B, respectively. If C is the center of the ellipse, then find area of triangle ABC.

A. 12sq, units

B. 48 units

C. 64 sq units

D. 24 sq.units

Answer: D

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37. The equation of the chord of the ellipse $2x^2 + 5y^2 = 20$ which is bisected at the point $(2, 1)$ is

A. $4x + 5y + 13 = 0$

B. $4x + 5y = 13$

C. $5x + 4y + 13 = 0$

D. none of these

Answer: B

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38. AB is a diameter of $x^2 + 9y^2 = 25$. The eccentric angle of A is $\frac{\pi}{6}$. Then the eccentric angle of B is

A. $5\pi/6$

B. $-5\pi/6$

C. $-2\pi/3$

D. none of these

Answer: B

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39. if one end of a diameter of the ellipse $4x^2 + y^2 = 16$ is $(\sqrt{3}, 2)$ then the other end ,is

A. $(-\sqrt{3}, 2)$

B. $(\sqrt{3}, -2)$

C. $(-\sqrt{3}, -\sqrt{2})$

D. $(0, 0)$

Answer: C

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40. the equation of a diameter conjugate to a diameter $y = \frac{b}{a}x$ of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

A. $y = -\frac{b}{a}x$

B. $y = -\frac{a}{b}x$

C. $y = \frac{a}{b}x$

D. none of these

Answer: A

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41. If A,A' are the vertices S,S' are the foci and Z,Z' are the feet of the directrices of an ellipse with centre C, then CS CA ,CZ are in

A. A.P

B. G.P

C. H.P

D. none of these

Answer: B

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42. The eccentricity of an ellipse whose pair of a conjugate diameter are $y = x$ and $3y = -2x$ is (A) $\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) none

A. $2/3$

B. $1/3$

C. $1/\sqrt{3}$

D. none of these

Answer: C

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43. The locus of the point of intersection of tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ which meet at right , is

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: A

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44. The number of maximum normals that can be drawn from any point to an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, is

A. 2

B. 3

C. 4

D. 1

Answer: C

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45. The sum of the squares of the perpendiculars on any tangent to the ellipse a 2 x 2 + b 2 y 2 =1 from two points on the minor axis, each at a distances ae from the centre, is

A. $2a^2$

B. $2b^2$

C. $a^2 + b^2$

D. $a^2 - b^2$

Answer: A

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46. If the polar with respect to $y^2 = 4ax$ touches the ellipse $\frac{x^2}{\alpha^2} + \frac{y^2}{\beta^2} = 1$, the locus of its pole is (a) $\frac{x^2}{\alpha^2} - \frac{y^2}{4a^2\alpha^2/\beta^2} = 1$ (b) $\frac{x^2}{\alpha^2} + \frac{\beta^2 y^2}{4a^2} = 1$ (c) $a^2x^2 + b^2y^2 = 1$ (d) None of these

A. $\frac{x^2}{\alpha^2} - \frac{y^2}{(4a^2\alpha^2/\beta^2)} = 1$

B. $\frac{x^2}{\alpha^2} - \frac{\beta^2 y^2}{4a^2} = 1$

C. $\alpha^2x^2 + \beta^2y^2 = 1$

D. none of these

Answer: A

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47. If p and q are the segments of a focal chord of an ellipse $b^2x^2 + a^2y^2 = a^2b^2$ then

A. $a^2(p+q) = 2bpq$

B. $b^2(p+q) = 2apq$

C. $a(p+q) = 2b^2pq$

D. $b(p+q) = 2a^2pq$

Answer: B

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48. If $\frac{x}{a} + \frac{y}{b} = \sqrt{2}$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then find the eccentric angle θ of point of contact.

A. 0°

B. 90°

C. 45°

D. 60°

Answer: C

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49. Let P be a point on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ of eccentricity e. If A, A' are the vertices and S, S are the foci of the ellipse, then find the ratio area PSS'' : area APA'.

A. $e^3:1$

B. $e^2:1$

C. $e:1$

D. $1/e:1$

Answer: C

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50. if $P(\theta)$ and $Q\left(\frac{\pi}{2}+\theta\right)$ are two points on the ellipse $\frac{x^2}{a^2}+\frac{y^\circ}{b^2}=1$, locus ofmid point of PQ is

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{2}$

B. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=4$

C. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$

D. none of these

Answer: A

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51. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, and having center at (0,3) is

A. 4

B. 3

C. $\sqrt{12}$

D. $7/2$

Answer: A

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52. The center of the ellipse $\frac{(x+y-2)^2}{9}+\frac{(x-y)^2}{16}=1$is

A. $(0,0)$

B. $(1,1)$

C. $(1,0)$

D. $(0,1)$

Answer: B

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53. In an ellipse, the distance between its foci is 6 and minor axis is 8. Then, its eccentricity is

A. $4/5$

B. $1/\sqrt{52}$

C. $3/5$

D. $1/2$

Answer: C

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54. S and T are foci of an ellipse and B is an end of the minor axis , if STB is an equilateral triangle , the eccentricity of the ellipse , is

A. $1/4$

B. $1/3$

C. $1/2$

D. $2/3$

Answer: C

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55. the length of the latusrectum of an ellipse is one thrid of its major axis , its eccentricity would be

A. $2/3$

B. $\sqrt{2/3}$

C. $1/\sqrt{3}$

D. $1/\sqrt{2}$

Answer: B

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56. If the length of the major axis of an ellipse in 3 times the length of minor axis , then its eccentricity is

A. $1/3$

B. $1/\sqrt{3}$

C. $1/\sqrt{2}$

D. $2\sqrt{2}/3$

Answer: D

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57. The distance between the foci of the ellipse $5x^2 + 9y^2 = 45$ is

A. $2\sqrt{2}$

B. 4

C. $4\sqrt{2}$

D. 2

Answer: B

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58. the length of the latusrectum of the ellipse $\frac{x^2}{36} + \frac{y^2}{49} = 1$, is

A. $98/6$

B. $72/7$

C. $72/14$

D. $98/12$

Answer: B

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59. The co-ordinates of a focus of an ellipse is (4,0) and its eccentricity is $\frac{4}{5}$ Its equation is :

A. $\frac{x^2}{3^2}+\frac{y^2}{5^2}=1$

B. $\frac{x^2}{5^2}+\frac{y^2}{3^2}=1$

C. $\frac{x^2}{5^2}+\frac{y^2}{4^2}=1$

D. $\frac{x^2}{4^2}+\frac{y^2}{5^2}=1$

Answer: B

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60. the equation of the ellipse passing through (2,1) having e=1/2 , is

A. $3x^2 + 4y^2 = 16$

B. $3x^2 + 5y^2 = 17$

C. $5x^2 + 3y^2 = 23$

D. none of these

Answer: A

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61. If C is the centre of the ellipse $9x^2 + 16y^2 = 144$ and S is one focus. The ratio of CS to major axis, is

A. $\sqrt{7} : 16$

B. $\sqrt{7} : 4$

C. $\sqrt{5} : \sqrt{7}$

D. none of these

Answer: D

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62. In an ellipse the distance between the foci is 8 and the distance between the directrices is 25. The length of major axis, is

A. $10\sqrt{2}$

B. $20\sqrt{2}$

C. $30\sqrt{2}$

D. none of these

Answer: A

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63. The centre of the ellipse $4x^2 + 9y^2 + 16x - 18y - 11 = 0$ is

A. (-2, -1)

B. (-2, 1)

C. (2, -1)

D. none of these

Answer: B

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64. If P is any point on the ellipse $9x^2 + 36y^2 = 324$ whose foci are S and S'. Then, SP + S' P equals

A. 3

B. 12

C. 36

D. 324

Answer: B

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65. An ellipse is described by using an ellipse string which is passed over two pins. If the axes are 6 atm are 6 cm and 4 cm, then find the length of the string and distance between the pins

A. $6, 2\sqrt{5}$

B. $6, \sqrt{5}$

C. $4, 2\sqrt{5}$

D. none of these

Answer: D

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66. Two perpendicular tangents drawn to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ intersect on the curve.

A. x = a/e

B. $x^2 + y^2 = 41$

C. $x^2 + y^2 = 9$

D. $x^2 - y^2 = 41$

Answer: B

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67. The distance of the point $'\theta'$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ from a focus, is

A. $a(e + \cos\theta)$

B. $a(e - \cos\theta)$

C. $a(1 + e\cos\theta)$

D. $a(1 + 2e\cos\theta)$

Answer: C

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68. If y = mx + c is a tangent to the ellipse $x^2 + 2y^2 = 6$, them $c^2 =$

A. $36/m^2$

B. $6m^2 - 3$

C. $3m^2 + 6$

D. $6m^2 + 3$

Answer: D

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69. Let P be a variable point on the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ with foci at S and S'. If A be the area of triangle PSS' then the maximum value of A, is

A. 24 sq. units

B. 12 sq. units

C. 36 sq. units

D. none of these

Answer: B

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70. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the straight line $y = mx + c$ intersect in real points only if:

A. $a^2m^2 < c^2 - b^2$

B. $a^2m^2 > c^2 - b^2$

C. $a^2m^2 \geq c^2 - b^2$

D. $c \geq b$

Answer: C

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71. Let E be the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and C be the circle $x^2+y^2=9$. Let $PandQ$ be the points (1, 2) and (2, 1), respectively. Then Q lies inside C but outside $E\,Q$ lies outside both $CandE\,P$ lies inside both C and E P lies inside C but outside E

A. Q lies inside C but outside E

B. Q lies outside both C and E

C. P lies inside both C and E

D. P lies inside C but outside E

Answer: D

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72. Equation of the ellipse with accentricity 1/2 and foci at $(\pm 1, 0)$, is

A. $\frac{x^2}{3}+\frac{y^2}{4}=1$

B. $\frac{x^2}{4}+\frac{y^2}{3}=1$

C. $\frac{x^2}{4}+\frac{y^2}{3}=\frac{4}{3}$

D. none of these

Answer: B

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73. If B and B' are the ends of minor axis and S and S' are the foci of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$, then area of the rhombus SBS' B', in square units, will be

A. 12

B. 48

C. 24

D. 36

Answer: C

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74. The length of the axes of the conic $9x^2 + 4y^2 - 6x + 4y + 1 = 0$,are

A. $1/2, 9$

B. $3, 2/5$

C. $1, 2/3$

D. 3, 2

Answer: C

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75. If the normal at any point P on ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ meets the auxiliary circle at Q and R such that $\angle QOR = 90^\circ$ where O is centre of ellipse, then

A. $a^4 + 2b^4 \geq 3a^2b^2$

B. $a^4 + 2b^4 \geq 5a^2b^2 + 2a^3b$

C. $a^4 + 2b^4 \geq 3a^2b^2 + ab$

D. none of these

Answer: B

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76. If the curves $x^2 + 4y^2 = 4$, $x^2 + a^2y^2 = a^2$ for suitable value of a cut on four concylclic points, the equation of the circle passing through the four points, is

A. $x^2 + y^2 = 2$

B. $x^2 + y^2 = 1$

C. $x^2 + y^2 = 4$

D. $x^2 + y^2 = 3$

Answer: B

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77. If $P(\theta), Q\left(\theta+\frac{\pi}{2}\right)$ are two points on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and α is the angle between normals at P and Q, then

A. $2\sqrt{1-e^2}=e\sin^2 2\theta\tan\alpha$

B. $2\sqrt{1-e^2}=e\sin^2\theta\tan 2\alpha$

C. $\sqrt{1-e^2}=2e^2\sin^2 2\theta\tan\alpha$

D. $2\sqrt{1-e^2}=e^2\sin 2\theta\tan\alpha$

Answer: D

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78. An ellipse has point $(1,-1)and(2,-1)$ as its foci and $x+y-5=0$ as one of its tangents. Then the point where this line touches the ellipse is $\left(\frac{32}{9},\frac{22}{9}\right)$ (b) $\left(\frac{23}{9},\frac{2}{9}\right)$ $\left(\frac{34}{9},\frac{11}{9}\right)$ (d) none of these

A. $\left(\frac{34}{9},\frac{11}{9}\right)$

B. $\left(\frac{32}{9}, \frac{13}{9}\right)$

C. $\left(-\frac{34}{9}, \frac{79}{9}\right)$

D. $\left(-\frac{32}{9}, \frac{77}{9}\right)$

Answer: A

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79. If the length of the semi major axis of an ellipse is 68 and the eccentricity is $\frac{1}{2}$ then the area of the rectangle formed by joining the vertices of the latus rectum of the ellipse is equal to

A. 69930

B. 6935

C. 6936

D. 3696

Answer: C

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80. If the tangent at the point $\left(4\cos\theta, \frac{16}{\sqrt{11}}\sin\theta\right)$ to the ellipse $16x^2 + 11y^2 = 256$ is also a tangent to the circle $x^2 + y^2 - 2x - 15 = 0$, then the value of θ, is

A. $\pm\pi/2$

B. $\pm\pi/4$

C. $\pm\pi/3$

D. $\pm\pi/6$

Answer: C

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Chapter Test

1. Find the maximum area of an isosceles triangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$with its vertex at one end of the major axis.

A. $\sqrt{3}ab$

B. $\frac{3\sqrt{3}}{4}ab$

C. $\frac{5\sqrt{3}}{4}$

D. none of these

Answer: B

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2. A tangent to the ellipse $x^2+4y^2=4$ meets the ellipse $x^2+2y^2=6$ at P&Q. The angle between the tangents at P and Q of the ellipse x 2 +2y 2 =6 is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: A

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3. The distance of a point on the ellipse $\frac{x^2}{6}+\frac{y^2}{2}=1$ from the center is 2. Then the eccentric angle of the point is $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{6}$

A. $\frac{\pi}{4}, \frac{3\pi}{4}$

B. $\frac{\pi}{3}, \frac{2\pi}{3}$

C. $\pi/2$

D. none of these

Answer: A

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4. If the minor axis of an ellipse subtends an angle of 60° at each focus of the ellipse, then its eccentricity, is

A. $\sqrt{3}/2$

B. $1/\sqrt{2}$

C. $2/\sqrt{3}$

D. none of these

Answer: A

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5. Let $SandS'$ be two foci of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. If a circle described on SS' as diameter intersects the ellipse at real and distinct points, then the eccentricity$e$ of the ellipse satisfies (a)$e=\frac{1}{\sqrt{2}}$ (b) $e\in\left(\frac{1}{\sqrt{2}},1\right)$ (c) $e\in\left(0,\frac{1}{\sqrt{2}}\right)$ (d) none of these

A. $2/\sqrt{3}$

B. $\sqrt{3}/2$

C. $1/\sqrt{2}$

D. $1/\sqrt{3}$

Answer: C

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6. The equation of the normal at the point P (2, 3) on the ellipse $9x^2 + 16y^2 = 180$, is

A. $3y = 8x - 10$

B. $3y - 8x + 7 = 0$

C. $8y + 3x + 7 = 0$

D. $3x + 2y + 7 = 0$

Answer: B

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7. For the ellipse $3x^2 + 4y^2 + 6x - 8y - 5 = 0$ the eccentrically, is

A. $1/3$

B. $1/2$

C. $1/4$

D. $1/5$

Answer: B

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8. Let S, S' be the focil and BB' be the minor axis of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. If $\angle BSS' = \theta$, then the eccentricity e of the ellipse is equal to

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9. If the length of the latusrectum of the ellipse $x^2 \tan^2 \theta + y^2 \sec^2 \theta = 1$ is 1/2, then $\theta =$

A. $\pi/12, 5\pi/12$

B. $\pi/6, 5\pi/6$

C. $7\pi/12$

D. none of these

Answer: A

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10. if vertices of an ellipse are $(-4, 1), (6, 1)$ and $x - 2y = 2$ is focal chord then the eccentricity of the ellipse is

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

B. $\frac{(x+1)^2}{25} + \frac{(y+1)^2}{9} = 1$

C. $\frac{(x-1)^2}{16} + \frac{(y-1)^2}{25} = 1$

D. $\frac{(x+1)^2}{16}+\frac{(y+1)^2}{25}=1$

Answer: A

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11. If (-4, 3) and (8, 3) are the vertices of an ellipse whose eccentricity is 5/6 then the equation of the ellipse is

A. $\frac{(x-2)^2}{11}+\frac{(y-3)^2}{36}=1$

B. $\frac{(x-2)^2}{36}+\frac{(y-3)^2}{11}=1$

C. $\frac{(x-3)^2}{36}+\frac{(y-2)^2}{11}=1$

D. none of these

Answer: B

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12. If the chord joining points $P(\alpha)$ and $Q(\beta)$ on the ellipse $\left(\frac{x^2}{a^2}\right)+\left(\frac{y^2}{b^2}\right)=1$ subtends a right angle at the vertex $A(a,0)$, then prove that $\tan\left(\frac{a}{2}\right)\tan\left(\frac{\beta}{2}\right)=-\frac{b^2}{a^2}$.

A. a^2/b^2

B. $-a^2/b^2$

C. b^2/a^2

D. $-b^2/a^2$

Answer: D

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13. If $P(\alpha,\beta)$ is a point on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with foci $SandS'$ and eccentricity e, then prove that the area of $\Delta SPS'$ is $be\sqrt{a^2-\alpha^2}$

A. $ae\sqrt{a^2-\alpha^2}$

B. $be\sqrt{b^2-\alpha^2}$

C. $ae\sqrt{b^2-\alpha^2}$

D. $be\sqrt{a^2-\alpha^2}$

Answer: D

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14. The tangent at any point P on the ellipse meets the tangents at the vertices A & A^1 of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at L and M respectively. Then $AL.\ A^1M$= (A) a^2 (B) b^2 (C) a^2+b^2 (D) ab

A. a + b

B. a^2+b^2

C. a^2

D. b^2

Answer: D

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15. P is a point on the circle $x^2 + y^2 = c^2$. The locus of the mid-points of chords of contact of P with respect to $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1,$ is

A. $c^2\left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right) = x^2 + y^2$

B. $c^2\left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right)^2 = x^2 + y^2$

C. $c^2\left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right) = \left(x^2 + y^2\right)^2$

D. none of these

Answer: A

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16. The equation of the locus of the poles of normal chords of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is:

A. $\frac{x^2}{a^4} + \frac{y^2}{b^4} = a^2 + b^2$

B. $\frac{x^2}{a^4} + \frac{y^2}{b^4} = a^2 - b^2$

C. $\frac{a^6}{x^2}+\frac{b^6}{y^2}=\left(a^2-b^2\right)^2$

D. $\frac{a^4}{x^2}+\frac{b^4}{y^2}=\left(a^2-b^2\right)^2$

Answer: C

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17. The locus of mid-points of focal chords of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{x}{a^2}$

B. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{ex}{a^2}$

C. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{x^2}{a^4}$

D. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{ex}{a}$

Answer: B

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18. The locus of a point whose polar with respect to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ touches the parabola $y^2=4kx$ is:

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{d^2}$

B. $\frac{x^2}{a^4}+\frac{y^2}{b^4}=\frac{1}{d^2}$

C. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{d^4}$

D. none of these

Answer: B

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19. if the chord of contact of tangents from a point P to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ subtends a right angle at the centre, then the locus of P is

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{a^2}+\frac{1}{b^2}$

B. $\frac{x^2}{a^4}+\frac{y^2}{b^4}=\left(\frac{1}{a}+\frac{1}{b}\right)^2$

C. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{a^4}+\frac{1}{b^4}$

D. $\frac{x^2}{a^4}+\frac{y^2}{b^4}=\frac{1}{a^2}+\frac{1}{b^2}$

Answer: D

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20. The locus of the poles of tangents to the auxiliary circle with respect to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, is

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{a^2}$

B. $\frac{x^2}{a^4}+\frac{y^2}{b^4}=\frac{1}{b^2}$

C. $\frac{x^2}{a^4}+\frac{y^2}{b^4}=\frac{1}{a^2}$

D. none of these

Answer: C

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21. The locus of the poles of tangents to the director circle of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with respect to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{a^2+b^2}$

B. $\frac{x^2}{a^4}+\frac{y^2}{b^4}=\frac{1}{a^2+b^2}$

C. $\frac{x^2}{a^6}+\frac{y^2}{b^6}=\frac{1}{a^2+b^2}$

D. none of these

Answer: B

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22. P is a point on the circle $x^2+y^2=c^2$. The locus of the mid-points of chords of contact of P with respect to $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1,$ is

A. $\left(\frac{x^2}{a^2}+\frac{y^2}{b^2}\right)^2=\frac{x^2}{a^4}+\frac{y^2}{b^4}$

B. $\left(\frac{x^2}{a^2}+\frac{y^2}{b^2}\right)^2=b^2\left(\frac{x^2}{a^4}+\frac{y^2}{b^4}\right)$

C. $\left(\frac{x^2}{a^2}+\frac{y^2}{b^2}\right)^2=a^2\left(\frac{x^2}{a^4}+\frac{y^2}{b^4}\right)$

D. none of these

Answer: B

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23. If the tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ makes intercepts p and q on the coordinate axes, then $\frac{a^2}{p^2}+\frac{b^2}{q^2}=$

A. 1

B. 2

C. 3

D. 4

Answer: A

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24. If the tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ make angles $\alpha and \beta$ with the major axis such that $\tan\alpha+\tan\beta=\gamma,$ then the locus of their point of intersection is $x^2+y^2=a^2$ (b) $x^2+y^2=b^2$ $x^2-a^2=2\lambda xy$ (d) $\lambda\left(x^2-a^2\right)=2xy$

A. $x^2+y^2=a^2$

B. $x^2+y^2=b^2$

C. $x^2-a^2=2\lambda xy$

D. $\lambda\left(x^2-a^2\right)=2xy$

Answer: D

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25. If C is centre of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and the normal at an end of a latusrectum cuts the major axis in G, then CG =

A. a^2e^2

B. ae^3

C. a^2e^3

D. ae

Answer: B

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26. If the normals at $P(\theta)$ and $Q\left(\frac{\pi}{2}+\theta\right)$ to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ meet the major axis at $Gandg,$ respectively, then $PG^2+Qg^2=$

$b^2\left(1-e^2\right)\left(2-e\right)^2$ $a^2\left(e^4-e^2+2\right)$ $a^2\left(1+e^2\right)\left(2+e^2\right)$

$b^2\left(1+e^2\right)\left(2+e^2\right)$

A. $b^2\left(1-e^2\right)\left(2-e^2\right)$

B. $a^2\left(1-e^2\right)\left(2-e^2\right)$

C. $a^2\left(1+e^2\right)\left(2+e^2\right)$

D. $b^2\left(1+e^2\right)\left(2+e^2\right)$

Answer: B

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27. about to only mathematics

A. 1

B. 2

C. 3

D. 4

Answer: A

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28. The tangent at point P on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ cuts the minor axis in Q and PR is drawn perpendicular to the minor axis. If C is the centre of the ellipse, then $CQ \cdot CR =$

A. b^2

B. $2b^2$

C. a^2

D. $2a^2$

Answer: A

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29. If the lengths of major and semi-minor axes of an ellipse are 4 and $\sqrt{3}$ and their corresponding equations are y - 5 = 0 and x + 3 = 0, then the equation of the ellipse, is

A. $3x^2 + 4y^2 + 18x - 40y + 115 = 0$

B. $4x^2 - 3y^2 - 24x + 30y + 99 = 0$

C. $3x^2 - 4y^2 - 18x + 40y + 115 = 0$

D. $4x^2 + 3y^2 + 24x - 30y + 99 = 0$

Answer: A

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