MATHS

BOOKS - PATHFINDER MATHS (BENGALI ENGLISH)

PARABOLA, ELLIPSE AND HYPERBOLA

Question Bank

1. The coordinates of focus of the parabola $y^2 = -5x$ are _

A. (-5,0)

B. (0,-5/4)

C. (-5/4,0)

D. (0,-5)

Answer: C

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2. The equation of directrix of the parabola $4x^2 = 3y$ is _

A. 16x+3=0

B. 16y+3=0

C. 16x-3=0

D. 16y-3=0

Answer: B

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3. The length of latus rectum of the parabola $(y-1)^2 = -6(x+2)$ is_

A. 6 units

B. 3/2 units

C. 24 units

D. none of these

Answer: A

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4. If the coordinates of vertex and focus of a parabola be (2,1) & (2,3) respectively, then the axis of the parabola will be

A. a) Y-axis

B. b)X-axis

C. c)Parallel to the Y-axis

D. d)Parallel to the X-axis

Answer: C

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5. The coordinates of focus of the parabola $2y^2 = -5x$ are

A. (-5/8,0)

B. (-5/2,0)

C. (0,-5/2)

D. (0,-5/8)

Answer: D

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6. The equation of directrix of the parabola $3x^2 = -4y$ is

A. 3y-1=0

B. 3x-1=0

C. 3y+1=0

D. 3x+1=0

Answer: B

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7. The coordinates of the vertex of the parabola $(x+1)^2 = -9(y+2)$ are

A. (-1,-2)

B. (1,2)

C. (-1,2)

D. (1,-2)

Answer: A

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8. Find the length of the latus rectum of the parabola $y = -2x^2 + 12x - 17$.

A. 1/2 unit

B. 2 units

C. 1 units

D. none of these

Answer: A

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9. The vertex of a parabola is at the origin and its focus is $\left(0, -\frac{5}{4}\right)$, find the equation of

the parabola.

A. $x^2 = 5y$

B. $y^2 = 5x$

C. $x^2 = -5y$

D. $y^2 = -5x$

Answer: C

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10. Find the point on the parabola $y^2 = -36x$ at which the ordinate is three times the abscissa .

A. (4,12)

B. (-12,-4)

C.)-4,-12)

D. (12,-4)

Answer: C

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11. The coordinates of the vertex and focus of a parabola are (1,2) and (-1,2) respectively : find its equation.

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12. Find the equation of the parabola whose vertexi is the point (1,-2) and the eqation of directrix is $y + 5 = 0$.

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13. Find the equatio of the parabola whose focus is at the origin and the equation of directrix is $x + y = 1$.

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14. Find the coordinates of vartex and the length of latus rectum of the parabola whose focus is (0,0) and the directrix is the line $2x + y = 1$

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15. If θ is a variable paramete, then the equations

$$x = \frac{1}{4}\left(3 - \cos ec^2\theta\right), y = 2 + \cot\theta$$

represent the equation of a/an

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16. The locus of middle points of a family of focal chord of the parabola $y^2 = 4ax$ is-

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17. The coordinates of the two ends of latus rectum of a parabola are (8,1) and (-4,1) , find the equation of the parabola.

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18. A parabola passes through the points (0.0) ,(2,2) and (-2,-6) and its asix ia parallel to y-axis . Find its equation .

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19. If $(at^2, 2at)$ be the coordinate of an extremity of a focal chord of the parabola $y^2 = 4ax$, then the length of the chord is-

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20. The directrix of a parabola is x + y + 4 = 0 and vertix is the point (-1,-1) . Find (i) the position of focus and (ii) the equation of the parabola.

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21. Show that the equation of the chord of the parabola $y^2 = 4ax$ through the points (x_1, y_1) and (x_2, y_2) on its `(y-y_1)(y-y_2)=y^2-4ax.

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22. The pt. $(2 + 4\cos\theta, 1 + 2\sin\theta)$ represents the parametric coordinates of any point on the ellipse centre is

A. a. (-2,1)

B. b. (2,1)

C. c. (2,-1)

D. d.(-2,-1)

Answer: B

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23. If eccentricities of the ellipse $\frac{x^2}{36}+\frac{y^2}{25}=1$ and $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1\left(a^2<b^2\right)$ be equal, then a:b=

A. 4,3

B. 9,5

C. 3:5

D. 5:6

Answer: D

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24. The length of the latus rectum of the ellipse $2x^2 + 4y^2 = 16$ is

A. $\sqrt{2}$ units

B. 2 units

C. $2\sqrt{2}$ units

D. none of these

Answer: C

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25. The coordinates of the foci of the ellipse $20x^2 + 4y^2 = 5$ are

A. $(0, \pm 1)$

B. $(0, \pm \sqrt{2})$

C. $(\pm 1, 0)$

D. $(\pm \sqrt{2}, 0)$

Answer: A

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26. The length of the semi-major axis of an ellipse is 13 and its eccentricity is 12/13. Then the length of the semi-minor axis is

A. 12

B. 6

C. 10

D. 5

Answer: D

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27. The eccentricy of the ellipse $x^2 + 4y^2 + 2x - 24y + 33 = 0$ is

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28. find the length of the latus rectum of the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$

A. 16/3 units

B. 32/3 units

C. 3/4 units

D. 9/2 units

Answer: D

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29. The coordinates of the point on the ellipse $9x^2 + 16y^2 = 144$ are $\left(2, \frac{3\sqrt{3}}{2}\right)$, find the eccentric angle of the point .

A. 60°

B. 30°

C. 45°

D. none of these

Answer: A

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30. If the distance between the foci of an ellipse is equal to the length of the latus rectum, then its eccentricity is _

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

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

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

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

Answer: B

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31. Find the eccentricity, the length of latus rectum and the centre of ellipse

$9x^2 + 16y^2 - 54x + 64y + 1 = 0$

A. 44320

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

C. $\frac{\sqrt{7}}{4}$

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

Answer: C

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32. Find the eccentricity of the ellipse if the length of minor axis is equal to half the distance between the foci of the ellipse .

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

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

C. $\frac{\sqrt{7}}{4}$

D. $\frac{\sqrt{7}}{3}$

Answer: A

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33. The eccentricity of an ellipse whose distance between the foci is 4 and distance between the directories is 16 is

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

B. $\frac{1}{\sqrt{3}}$

C. 44256

D. 44228

Answer: D

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34. Taking major and minor axes as x and y - axes respectively , find the equation of the ellipse

whose eccentricity is $\frac{1}{\sqrt{2}}$ and the sum of the squares of major and minor axes is 24 .

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35. Find the equation of the ellipse whose foci $(0, \pm 4)$ and the equation of directries is $y = \pm 9$.

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36. The eccentricity of an ellipse is $\frac{2}{3}$ focus is S(5,4) and the major axis and directrix intersect at Z(8,7) . Find the coordinates of the centre of the ellipse .

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37. Find the equation to the ausiliary circle of the ellipse

$4x^2 + 9y^2 - 24x - 36y + 36 = 0$.

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38. The coordinates of the focus of an ellipse are (1,2) and eccentricity is $\frac{1}{2}$, the equation of its directrix is 3x + 4y - 5 = 0 . Find the equation of the ellipse.

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39. Find the length of the latus rectum, eccentricity, coordinates of centre and foci of the ellipse $3x^2 + 4y^2 + 6x - 8y - 5 = 0$.

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40. Find the equation of the ellipse whose vertices are (-3,5) and (9,5) and eccentricity is $\frac{\sqrt{5}}{3}$.

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41. A line segment of length (a+b) units moves on a plane in such a way that its end points always lie on the coordinates axes. Suppose that P is a point on the line segment it in the ratio a:b. Prove that the locus of P is an ellipse.

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42. Find the eccentricity and equations of the directrices of the ellipse $\frac{x^2}{100} + \frac{y^2}{36} = 1$.

Show that the sum of the focal distances of any point on this ellipse is constant .

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43. If the chord joining the points $P(\theta)$ ' and '$Q(\phi)$' of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ subtends a right angle at (a,0) prove that $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{\phi}{2}\right)=-\frac{b^2}{a^2}$.

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44. P and Q be the extremities of the two conjugate diameters of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, Show that the locus of the middle point of PQ is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{2}$.

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45. The length of latus rectum of the hyperabola $9y^2-4x^2=36$ is -

A. 9/2 units

B. 9 units

C. 7/2 units

D. 8 units

Answer: B

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46. If the latus rectum of a hyperbola is equal to half of its transverse axis, then its eccentricity is -

A. $\sqrt{2}$

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

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

D. none of these

Answer: C

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47. The centre of the hyperbola $9x^2 - 16y^2 - 18x + 64y - 199 = 0$ is

A. (1,2)

B. (1,-2)

C. (-1,2)

D. (-1,-2)

Answer: A

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48. If foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ coincide with the foci of the hyperbola

$\left(\frac{x^2}{144} - \frac{y^2}{81}\right) = \frac{1}{25}$, then the value of b^2 is -

A. 6

B. 7

C. 8

D. 9

Answer: B

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49. The eccentricity of the hyperbola $x^2 - y^2 = 4$ is

A. 2

B. $2\sqrt{2}$

C. $\sqrt{2}$

D. none of these

Answer: C

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50. Find the equation to the locus represented by the parametric equations $x = 2t^2 + t + 1, y = t^2 - t + 1.$

A. circle

B. parabola

C. ellipse

D. hyperbola

Answer: D

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51. The equation of the auxiliary circle of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is

A. 1. $x^2 + y^2 = a^2$

B. 2. $x^2 + y^2 = 4a^2$

C. 3. $x^2 + y^2 = b^2$

D. 4. $x^2 + y^2 = 4b^2$

Answer: A

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52. The eccentricity of the curve $9x^2 - 25y^2 = 225$ is

A. 44320

B. $\frac{\sqrt{34}}{5}$

C. 44289

D. $\frac{\sqrt{34}}{4}$

Answer: B

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53. The foci of the hyperbola $4x^2 - 9y^2 = 36$ is

A. $\left(0, \pm \frac{\sqrt{13}}{2}\right)$

B. $\left(\pm \frac{\sqrt{13}}{2}, 0\right)$

C. $\left(0, \pm \sqrt{13}\right.$

D. $\left(\pm \sqrt{13}, 0\right)$

Answer: C

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54. If the length of conjugate axis and the length of latus rectum of a hyperbola are equal, find its eccentricity.

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

B. $\sqrt{2}$

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

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

Answer: B

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55. The equations of directrices of hyperbola $4x^2 - 9y^2 - 16x - 54y - 101 = 0$ are

A. $x = 2 \pm \frac{3}{\sqrt{13}}$

B. $y = 2 - \ + \frac{3}{\sqrt{13}}$

C. $x = 2 - \ + \frac{9}{\sqrt{13}}$

D. $y = 2 - \ + \frac{9}{\sqrt{13}}$

Answer: C

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56. Find the equation of the hyperbola whose eccentricity is 3, focus is (-1,1) and equation of directrix is x - y + 3 = 0.

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57. Show that the difference of the distances from each focus of any point on the hyperbola $9x^2 - 16y^2 = 144$ is equal to the length of the transverse axis.

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58. Show that the eccentricities of the hyperbolas $\frac{x^2}{16} - \frac{y^2}{9} = 1$ and $\frac{x^2}{64} - \frac{y^2}{36} = 1$ are equal.

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59. Find the equation of the hyperbola, whose axes are axes of coordinates and transverse axis is 2a and the vertex bisects the line segment joining the centre and focus.

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60. Find the equation of the hyperbola whose vertices are $(\pm 4, 0)$ and $foci(\pm 6, 0)$.

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61. Show that $3x^2 - 3y^2 - 18x + 12y + 2 = 0$ represents a rectangular hyperbola. Find its centre, foci and eccentricity.

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62. In a rectangular hyperbola $x^2 - y^2 = a^2$, prove that $SP.S'P = CP^2$, where C is the centre and S, S' are the foci and P is any point on the hyperbola.

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63. If e_1 and e_2 be the eccentricities of a hyperbola and its conjugate, show that $\frac{1}{e_1^2} + \frac{1}{e_2^2} = 1.$

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64. Find the equation of the hyperbola, whose axes are axes of coordinates and distance between the foci is 10 and length of conjugate axis is 6.

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65. The length of the intercepts on the x and y-axes of a circle are 2a and 2b unit respectively. Prove that the locus of the centre of the circle is hyperbola whose equation $x^2 - y^2 = a^2 - b^2$. Translating the origin to a

suitable point show that the equation $5x^2 - 4y^2 - 20x - 8y - 4 = 0$ represents a hyperbola. Find its eccentricity, coordinates of foci and equations of the directrices.

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66. If the chord joining the points $(a\sec\theta, b\tan\theta)$and $(a\sec\phi, b\tan\phi)$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ passes through the focus (ae,0), prove that $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{\phi}{2}\right) + \frac{e-1}{e+1} = 0.$

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