MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

ELLIPSE

Solved Examples And Exercises

1. Find the distance between the directrices of the ellipse $\frac{x^2}{36} + \frac{y^2}{20} = 1$.

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2. If the eccentricity of an ellipse is $\frac{5}{8}$ and the distance between its foci is $10,$ then find the latusrectum of the ellipse.

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3. Find the eccentricity, centre, vertices, foci, minor axis, major axis, directrices and latus-

rectum of the ellipse

$25x^2 + 9y^2 - 150x - 90y + 225 = 0.$

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4. Find the eccentricity, foci and the length of the latusrectum of the ellipse

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

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5. For the following ellipses find ellipses find the lengths of major and minor axes, coordinates of foci, vertices and the eccentricity: $16x^2 + 25y^2 = 400$

$3x^2 + 2y^2 = 6\,x^2 + 4y^2 - 2x = 0$

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6. Show that $x^2 + 4y^2 - 2x + 16y + 13 = 0$ is the equation of an ellipse. Find its eccentricity.

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7. Find the equation of the ellipse with focus at $(-1, 1)$ and eccentricity 1/2 and directrix is x-y+3=0.


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8. Find the equation of the ellipse whose eccentricity is 1/2, the focus is $(1, 1)$ and the directrix is $x - y + 3 = 0$.


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

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10. A straight rod of given length slides between two fixed bars which include an ingle of90^0 . Show that the locus of a point on the rod which divides it in a given ratio is an

ellipse. If this ratio be 1/2, show that the eccentricity of the ellipse is $\sqrt{2}/3$.

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11. 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.

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12. Find the equation of the set of all points whose distances from (0,4) are $\frac{2}{3}$ of their distances from the line $y = 9$.

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

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14. If the latusrectum of an ellipse is equal to half of minor axis, find its eccentricity.

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15. Find the equation of the ellipse whose axes are parallel to the coordinate axes having its centre at the point $(2, -3)$ one focus at $(3, -3)$ and vertex at $(4, -3)$.

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16. Find the equation of the ellipse with foci at $(\pm 5, 0)$ and x=$\frac{36}{5}$ as one of the directrices.

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17. Find the equation of the ellipse whose centre is at the origin, foci are $(1, 0) and (-1, 0)$ and eccentricity is 1/2.

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18. Find the equation of the set of all points the sum of whose distance from the points $(3, 0) and (9, 0)$ is 12.

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19. A rod AB of length $15cm$ rests in between two coordinate axes in such a way that the end point A lies on $x-$ axis and end point B lies on y-axis . A point is taken on the rod in

such a way that $AP = 6cm$. Show that the locus of P is an ellipse.

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20. Find the equation of the ellipse whose foci are $(2, 3), (-2, 3)$ and whose semi-minor axes is $\sqrt{5}$.

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21. 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.

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22. An arc is in the form of a semi-ellipse. It is $8m$ wide and $2m$ high at the centre. Find the height of the arch at a point $1.5m$ from one end.

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


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24. Find the equation of the ellipse whose axes are along the coordinate axes, foci at $(0, \pm 4)$ and eccentricity 4/5.


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

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26. A man running a racecourse notes that the sum of the distances from the two flag posts from him is always 10 m and the distance

between the flag posts is 8 m. Find the equation of the posts traced by the man.

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27. Find the equation of the ellipse whose focus is (1,-2) the directrix $3x - 2y + 5 = 0$ and eccentricity equal to 1/2.

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28. Find the equation of the ellipse in the following case: focus is (0,1) , directrix is $x + y = 0 \, and \, e = \frac{1}{2}$.

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29. Find the equation of the ellipse in the following case: focus is (-1,1) directirx is $x - y + 3 = 0$ and $e = \frac{1}{2}$.

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30. Find the equation of the ellipse in the following case: focus is (-2,3) directrix is $2x + 3y + 4 = 0$ *and* $e = \frac{4}{5}$.

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31. Find the equation of the ellipse in the following case: focus is (1,2), directrix is $3x + 4y - 7 = 0$ and $e = \frac{1}{2}$.

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32. Find the eccentricity ,coordinates of foci ,length of the latus rectum of the following ellipse: $4x^2 + 9y^2 = 1$

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33. Find the eccentricity ,coordinates of foci, length of the latus rectum of the following ellipse: $25x^2 + 16y^2 = 1600.$

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34. Find the eccentricity ,coordinates of foci, length of the latus rectum of the following ellipse: $5x^2 + 4y^2 = 1$

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35. Find the eccentricity coordinates of foci, length of the latus rectum of the following ellipse: $4x^2 + 3y^2 = 1$

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36. Find the eccentricity, coordinates of foci, length of the latus rectum of the following ellipse: $9x^2 + 25y^2 = 225$

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

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

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39. Find the equation of the ellipse in the following case: eccentricity $e = \frac{2}{3}$ and length of latus rectum $= 5$.

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40. Find the equation of the ellipse in the following case: eccentricity $e = \frac{1}{2}$ and semi major axis $= 4$.

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41. Find the equation of the ellipse in the following case: eccentricity $e = \frac{1}{2}$ and major axis $= 12$

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42. Find the equation of the ellipse in the following case: the ellipse passes through (1,4) and (-6,1).

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

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44. Find the equation of the ellipse in the following case: ends of major axis $(\pm 3, 0)$ ends of minor axis $(0, \pm 2)$

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45. Find the equation for the ellipse that satisfies the given conditions: Ends of major axis $\left(0, \pm \sqrt{5}\right)$, ends of minor axis $(\pm 1, 0)$

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46. Find the equation for the ellipse that satisfies the given conditions: Length of major axis 26, foci $(\pm 5, 0)$

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47. Find the equation of the ellipse in the following case: Length of minor axis 16 ,foci $(0, \pm 6)$

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48. Find the equation of the ellipse in the following case: Foci $(\pm 3, 0), a = 4$

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49. Find the equation of the ellipse whose foci are (4,0) and (-4,0), eccentricity =1/3.

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50. Find the equation of the ellipse whose minor axis is equal to distance between the

foci and latus rectum is 10.

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51. Find the equation of the ellipse whose centre is (-2,3) and whose semi axes are 3 and 2 when major axis is (i.) parallel to x-axis (ii.) parallel to y-axis.

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

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53. Find the centre ,the lengths of the axes, eccentricity, foci of the following ellipse:2+2y^2-2x+12 y+10=0`

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54. Find the centre, the lengths of the axes, eccentricity, foci of the following ellips+4y^2-4x+24 y+31=0`

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55. Find the centre, the lengths of the axes, eccentricity, foci of the following ellipse: $4x^2 + y^2 - 8x + 2y + 1 = 0$

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56. Find the centre, the lengths of the axes, eccentricity, foci of the following ellipse: $4x^2 + 16y^2 - 24x - 32y - 120 = 0$

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57. Find the centre ,the lengths of the axes, eccentricity, foci of the following ellipse: $3x^2 + 4y^2 - 12x - 8y + 3 = 0$

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58. Find the centre ,the lengths of the axes, eccentricity, foci of the following ellipse: $x^2 + 4y^2 - 2x + 8y + 1 = 0$

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59. Find the equation of an ellipse whose foci are at $(\pm 3, 0)$ and which passes through (4,1).

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60. Find the equation of an ellipse whose eccentricity is 2/3, the latus rectum is 5 and the centre is at the origin.

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61. Find the equation of an ellipse with its foci on y-axis, eccentricity $\frac{3}{4}$, centre at the origin and passing through (6,4).

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62. Find the equation of an ellipse whose axes lie along coordinate axes and which passes through (4,3) and (-1,4).

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

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

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65. Find the equation of an ellipse whose vertices are $(0, \pm 10)$ and eccentricity $e = \frac{4}{5}$

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66. A rod of length 12 cm moves with its ends always touching the coordinate axes. Determine the equation of the locus of a point P on the rod, which is 3cm from the end in contact with the x-axis.

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67. If the lengths of semi major and semi minor axes of an ellipse are 2 and $\sqrt{3}$ and their corresponding equation are

$y - 5 = 0\ and\ x + 3 = 0$ then write the equation of the ellipse.

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68. Write the eccentricity of the ellipse $9x^2 + 5y^2 - 18x - 2y - 16 = 0.$

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69. Write the centre and eccentricity of the ellipse $3x^2 + 4y^2 - 6x + 8y - 5 = 0.$

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70. PSQ is a focal chord of the ellipse $4x^2 + 9y^2 = 36$ such that SP=4. If S' the another focus write the value of S'Q.

A. $\frac{2}{4}$

B. $\frac{15}{4}$

C. 7

D. $\frac{26}{5}$

Answer: $\frac{26}{5}$

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

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72. The eccentricity of the ellipse, if the distance between the foci is equal to the

lenght of the latus rectum, is

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73. If $S\,and\,S'$ are two foci of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1\,and\,B$ is and end of the minor axis such that $\mathrm{Delta}BSS'$ is equilateral, then write the eccentricity of the ellipse.

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

B. 7

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

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

Answer: $\frac{1}{2}$

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74. If the minor axis of an ellipse subtends an equilateral triangle with vertex at one end of major axis, then write the eccentricity of the ellipse.

A. $\sqrt{2}$

B. $\sqrt{3^2}$

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

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

Answer: $\sqrt{\frac{2}{3}}$

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75. If a latus rectum of an ellipse subtends a right angle at the centre of the ellipse, then write the eccentricity of the ellipse.

A. $e = \frac{\sqrt{10} - 1}{9}$

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

C. $e = \frac{\sqrt{9} + 1}{16}$

D. $e = \frac{\sqrt{9} + 1}{2}$

Answer: $e = \frac{\sqrt{5} - 1}{2}$

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76. For the ellipse $12x^2 + 4y^2 + 24x - 16y + 24 = 0$ a.centre is

$(-1, 2)$ b. lengths of the axes are $\sqrt{3}\ and\ 1$ c. eccentricity $= \sqrt{\frac{2}{3}}$ d. all of these

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77. The directrix of the parabola $x^2 - 4x - 8y + 12 = 0$ is

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78. The equation of the circle drawn with the two foci of $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ as the end-points of

a diameter is

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

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80. The eccentricity of the ellipse if the distance between the foci is equal to the

length of the latus rectum is a. $\frac{\sqrt{5}-1}{2}$ b. $\frac{\sqrt{5}+1}{2}$ c. $\frac{\sqrt{5}-1}{4}$ d. none of these

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81. The difference between the lengths of the major axis and the latus rectum of an ellipse is a. ae b. $2ae$ c. ae^2 d. $2ae^2$

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82. The eccentricity of the conic $9x^2 + 25y^2 = 225$ is a.$2/5$ b.$4/5$ c. $1/3$ d. $1/5$ e. 3/5

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83. The latus rectum of the conic $3x^2 + 4y^2 - 6x + 8y - 5 = 0$ is a.3 b. $\frac{\sqrt{3}}{2}$ c. $\frac{2}{\sqrt{3}}$ d. none of these

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84. Find the equations of the tangents drawn from the point (2, 3) to the ellipse $9x^2 + 16y^2 = 144.$

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85. The eccentricity of the ellipse $4x^2 + 9y^2 + 8x + 36y + 4 = 0$ is a. $\frac{5}{6}$ b. $\frac{3}{5}$ c. $\frac{\sqrt{2}}{3}$ d. $\frac{\sqrt{5}}{3}$

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86. The eccentricity of the ellipse $4x^2 + 9y^2 = 36$ is

a. $\frac{1}{2\sqrt{3}}$

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

c. $\frac{\sqrt{5}}{3}$

d. $\frac{\sqrt{5}}{6}$

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87. The eccentricity of the ellipse $5x^2 + 9y^2 = 1$ is a. $2/3$ b. $3/4$ c. $4/5$ d. $1/2$

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88. For the ellipse $x^2 + 4y^2 = 9$ a. the eccentricity is 1/2 b. the latus rectum is 3/2 c. a focus is $(3\sqrt{3}, 0)$ d. a directrix is $x = -2\sqrt{3}$

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

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90. 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

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

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

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91. Find the sum of the focal distances of any point on the ellipse $9x^2 + 16y^2 = 144$.

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92. If (2,4) and (10,10) are the ends of a latus rectum of an ellipse with eccentricity then the length of semi major axis is a.$20/3$ b. $15/3$ c. $40/3$ d. none of these

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93. The eccentricity of the ellipse $9x^2 + 25y^2 - 18x - 100y - 116 = 0$ is

a. $25/16$ b. $4/5$ c. $16/25$ d. $5/4$

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94. If the major axis of an ellipse is three times the minor axis, then its eccentricity is equal to

a. $\frac{1}{3}$ b. $\frac{1}{\sqrt{3}}$ c. $\frac{1}{\sqrt{2}}$ d. $\frac{2\sqrt{2}}{3}$ e. $\frac{3}{3\sqrt{2}}$

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95. The eccentricity of the ellipse $25x^2 + 16y^2 = 400$ is

a. $3/5$

b. $1/3$

c. $2/5$

d. $1/5$

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96. The eccentricity of the ellipse $5x^2 + 9y^2 = 1$ is a. $2/3$ b. $3/4$ c. $4/5$ d. $1/2$

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97. The eccentricity of the ellipse $4x^2 + 9y^2 = 36$ is a. $\frac{1}{2\sqrt{3}}$ b. $\frac{1}{\sqrt{3}}$ c. $\frac{\sqrt{5}}{3}$ d. $\frac{\sqrt{5}}{6}$

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Others

1. The equation of the ellipse with focus (-1,1) directrix $x - y + 3 = 0$ and eccentricity is a.

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

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

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

None of these

A. a.

$$7x^2 + 2xy + 7y^2 + 10x + 10y + 7 = 0$$

B. b.

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

C. c.

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

D. d. None of these

Answer:

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

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2. The difference of het ellipse, if the minor is equal to the distance between the foci is a. $\frac{\sqrt{3}}{2}$ b. $\frac{2}{\sqrt{3}}$ c. $\frac{1}{\sqrt{2}}$ d. $\frac{\sqrt{2}}{3}$

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

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

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

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

Answer: $\frac{1}{\sqrt{2}}$

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3. The equation $\frac{x^2}{2-\lambda}+\frac{y^2}{\lambda-5}+1=0$ represents an elipse, if

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