MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

HYPERBOLA

Others

1. Find the equation of the hyperbola whose foci are (8, 3) and (0, 3) and eccentricity is $\frac{4}{3}$.

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2. Show that the set all points such that the difference of their distances from $(4, 0) and (-4, 0)$ is always equal to 2 represents a hyperbola.

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3. If $e and e'$ the eccentricities of a hyperbola and its conjugate, prove that $\frac{1}{e^2} + \frac{1}{e'^2} = 1.$

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4. Find the locus of the point of intersection of the lines $\sqrt{3x} - y - 4\sqrt{3\lambda} = 0 and \sqrt{3}\lambda x + \lambda y - 4\sqrt{3} = 0$ for different values of λ.

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5. Show that the equation $9x^2 - 16y^2 - 18x + 32y - 151 = 0$ represents a hyperbola. Find the coordinates of the centre, lengths of the axes, eccentricity, latus-rectum,

coordinates of foci and vertices, equations of the directrices of the hyperbola.

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6. For the following hyperbolas find the lengths of transverse and conjugate axes, eccentricity and coordinates of foci and vertices, length of the latus-rectum, equations of the directrices:

$6x^2 - 9y^2 = 144\ 3x^2 - 6y^2 = -18$

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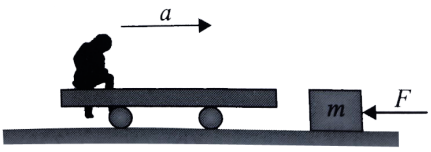
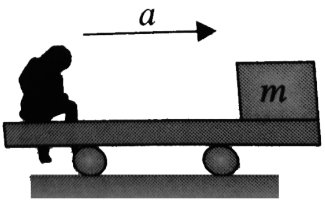
7.





Suppose you are sitting on an accelrating trolley car.

(i) Find the pseudo force action on the block of mass m placed on the trolley car.

If the block is placed (or moved) outside the trolley car, and an external force F acts in horizontal direction.

(ii) Find the pseudo force acting on the block as

viewed by the observer.

(iii) Find the acceleration of the block as seen by the obersever

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8. Find the equation of the hyperbola whose foci are $(6, 4) and (-4, 4)$ and eccentricity is 2.

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9. Find the equation of the hyperbola, the length of whose latusrectum is 8 and eccentricity is $3/\sqrt{5}$.

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10. The genes, which remains confined to differential region of Y-chromosome, are

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11. Find the equation of the hyperbola, referred to its principal axes of coordinates, in the following cases:

$Verticesat(\pm 5, 0), Fociat(\pm 7, 0)$

$Verticesat(0, \pm 7), e = \frac{4}{3}$

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12. Show that the equation $x^2 - 2y^2 - 2x + 8y - 1 = 0$ represents a hyperbola.

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13. If P is any point on the hyperbola whose axis are equal, prove that $SP\dot{S}'P = CP^2$.

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14. Find the equation of the hyperbola whose conjugate axis is 5 and the distance between the foci is 13.

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15. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Find the equation of the hyperbola, if its eccentricity is 2.

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16. If the distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then obtain its equation.

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17. The equation of the directrix of a hyperbola is $x - y + 3 = 0$. Its focus is (-1,1) and eccentricity 3. Find the equation of the hyperbola.

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

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19. Find the equation of the hyperbola whose : focus is (1,1) directrix is $3x + 4y + 8 = 0$ and eccentricity $= 2$

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20. Find the equation of the hyperbola whose : focus is (1,1) directrix is $2x + y = 1$ and eccentricity $= \sqrt{3}$

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21. Find the equation of the hyperbola whose : focus is (2,-1) directrix is $2x + 3y = 1$ and eccentricity $= 2$

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22. Find the equation of the hyperbola whose : focus $(a, 0)$, directrix is $2x - y + a = 0$ and eccentricity $= \frac{4}{3}$

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23. Find the equation of the hyperbola whose : focus is (2,2) directrix is $x + y = 9$ and eccentricity $= 2$.

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24. Find the eccentricity, coordinates of the foci ,equations of directrices and length of the latus rectum of the hyperbola :$9x^2 - 16y^2 = 144$

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25. Find the eccentricity, coordinates of the foci, equations of directrices and length of the latus rectum of the hyperbola $4x^2 - 3y^2 = 36$

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26. Find the eccentricity, coordinates of the foci ,equations of directrices and length of the latus rectum of the hyperbola $2x^2 - 3y^2 = 5.$

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27. Find the eccentricity, coordinates of the foci, equations of directrices and length of the latus rectum of the hyperbola $16x^2 - 9y^2 = 144$

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28. Find the eccentricity, coordinates of the foci, equations of directrices and length of the latus rectum of the hyperbola $3x^2 - y^2 = 4$

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29. Find the axes, eccentricity, latus rectum and the coordinates of the foci of the hyperbola $25x^2 - 36y^2 = 225.$

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30. Find the centre, eccentricity, foci and directrices of the hyperbola : $16x^2 - 9y^2 + 32x + 36y - 164 = 0$

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31. Find the centre, eccentricity, foci and directrices of the hyperbola : $x^2 - y^2 + 4x = 0$

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32. Find the centre, eccentricity, foci and directrices of the hyperbola : $x^2 - 3y^2 - 2x = 8.$

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33. Find the equation of the hyperbola, referred to its principal axes as axes of coordinates in the following cases: a. The distance between the foci $= 16$ and eccentricity $= \sqrt{2}$ b. Conjugate axis is 5 and the distance between foci $= 3$ c. Conjugate axis is 7 and passes through the point (3,-2).

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34. Find the eccentricity of the hyperbola, the length of whose conjugate axis is $\frac{3}{4}$ of the

length of transverse axis.

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35. Find the equation of the hyperbola whose: focus is at (5,2) vertex at (4,2) and centre at (3,2)

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36. Find the equation of the hyperbola whose: focus is at (4,2) and centre at (6,2) , e=2.

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37. In each of the following find the equations of the hyperbola satisfying the given condition: Vertices $(\pm 2, 0)$, $foci(\pm 3, 0)$

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38. Find the equations of the hyperbola satisfying the given conditions :Vertices $(0, \pm 5)$, $foci(0, \pm 8)$

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39. In each of the following find the equations of the hyperbola satisfying he given condition: vertices $(0, \pm 3) foci\ (0, \pm 5)$

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40. In each of the following find the equations of the hyperbola satisfying he given condition: foci $(\pm 5, 0)$ transverse axis $= 8$

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41. In each of the following find the equations of the hyperbola satisfying he given condition: $foci\ (0,\ \pm 13)$ conjugate axis $= 24$

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42. In each of the following find the equations of the hyperbola satisfying the given condition: $foci\ \left(\pm 3\sqrt{5}, 0\right)$, the latus rectum $= 8$

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43. In each of the following find the equations of the hyperbola satisfying the given condition: $foci\ (\pm 4, 0)$ the latus rectum $= 12$

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44. In each of the following find the equations of the hyperbola satisfying the given condition: vertices $(0,\ \pm 6),\ e = \frac{5}{3}$

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45. In each of the following find the equations of the hyperbola satisfying the given condition: foci $(0, \pm\sqrt{10})$ passing through (2,3)

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46. In each of the following find the equations of the hyperbola satisfying the given condition: foci $(0, \pm 12)$ latus rectum $= 36$

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47. Write the eccentricity of the hyperbola $9x^2 - 16y^2 = 144.$

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48. Find the eccentricity of the hyperbola whose latusrectum is half of its transverse axis.

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49. Write the coordinates of the foci of the hyperbola $9x^2 - 16y^2 = 144.$

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50. Write the equation of the hyperbola of eccentricity $\sqrt{2}$ if it is known that the distance between its foci is 16.

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51. If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide write the value of b^2.

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52. Write the length of the latus rectum of the hyperbola $16x^2 - 9y^2 = 144$.

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53. If the latus rectum through one focus subtends a right angle at the farther vertex of the hyperbola then its eccentricity is

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54. Write the distance between the directrices of the hyperbola $x = 8sec\theta,\ y = 8tan\theta$.

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55. Write the equation of the hyperbola whose vertices are $(\pm 3, 0)$ and foci at $(\pm 5, 0)$

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56. If $e_1 and\ e_2$ are respectively the eccentricities of the ellipse $\frac{x^2}{18} + \frac{y^2}{4} = 1$ and the hyperbola

$\frac{x^2}{9} - \frac{y^2}{4} = 1$, then write the value of $2e_1^2 + e_2^2$.

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57. Equation of the hyperbola whose vertices are $(\pm 3, 0)$ and foci at $(\pm 5, 0)$ is a. $16x^2 - 9y^2 = 144$ b. $9x^2 - 16y^2 = 144$ c. $25x^2 - 9y^2 = 225$ d. $9x^2 - 25y^2 = 81$

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58. If $e_1 and\ e_2$ are respectively the eccentricities of the ellipse $\frac{x^2}{18} + \frac{y^2}{4} = 1$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$, then the relation between $e_1 and\ e_2$ is a. $2e_1^2 + e_2^2 = 3$ b. $e_1^2 + 2e_2^2 = 3$ c. $2e_1^2 + e_2^2 = 3$ d. $e_1^2 + 3e_2^2 = 2$

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59. The distance between the directrices of the hyperbola $x = 8sec\theta,\ y = 8\,tan\theta,$ a. $8\sqrt{2}$ b. $16\sqrt{2}$ c. $4\sqrt{2}$ d. $6\sqrt{2}$

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60. The equation of the conic with focus at (1,-1) directrix along $x - y + 1 = 0$ and eccentricity $\sqrt{2}$ is a. $xy = 1$ b. $2xy + 4x - 4y - 1 = 0$ c. $x^2 - y^2 = 1$ d. $2xy - 4x + 4y + 1 = 0$

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61. The eccentricity of the conic $9x^2 - 16y^2 = 144$ is a. $\frac{5}{4}$ b. $\frac{4}{3}$ c. $\frac{4}{5}$ d. $\sqrt{7}$

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62. A point moves in a plane so that its distance PA and PB from who fixed points A and B in the plane satisfy the relation $PA - PB = k(k \neq 0)$ then the locus of P is a. a hyperbola b. a branch of the locus of P is c. a parabola d. an ellipse

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63. The eccentricity of the hyperbola whose latus rectum is half of its transverse axis is a.

$\frac{1}{\sqrt{2}}$ b. $\sqrt{\frac{2}{3}}$ c. $\sqrt{\frac{3}{2}}$ d. none of these

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64. The eccentricity of the hyperbola $x^2 - 4y^2 = 1$ is a. $\frac{\sqrt{3}}{2}$ b. $\frac{\sqrt{5}}{2}$ c. $\frac{2}{\sqrt{3}}$ d. $\frac{2}{\sqrt{5}}$

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65. The difference of the focal distances of anypoint on the hyperbola is equal to a. Length

of the conjugate axis b. Eccentricity c. Length of the transverse axis d. Latus rectum

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66. The foci of the hyperbola $9x^2 - 16y^2 = 144$ are a.$(\pm 4, 0)$ b. $(0, \pm 4)$ c. $(\pm 5, 0)$ d. $(0, \pm 5)$

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67. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$ then equation of the hyperbola is a.$x^2 + y^2 = 32$ b. $x^2 - y^2 = 16$ c. $x^2 + y^2 = 16$ d. $x^2 - y^2 = 32$

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68. If e_1 is the eccentricity of the conic $9x^2 + 4y^2 = 36$ *and* e_2 is the eccentricity of the conic $9x^2 - 4y^2 = 36$ then a. $e_1^2 - e_2^2 = 2$ b. $e_2^2 - e_1^2 = 2$ c. $2 < e_2^2 - e_1^2 < 3$ d.$e_1^2 - e_2^2 > 3$

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69. If the eccentricity of the hyperbola $x^2 - y^2 \sec^2 \alpha = 5\, is\, \sqrt{3}$ times the eccentricity the ellipse $x^2 \sec^2 \alpha + y^2 = 25\, then\, \alpha =$ a. $\frac{\pi}{6}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{2}$

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70. The equation of the hyperbola whose foci are (6,4) and (-4,4) and eccentricity 2 is a. $\frac{(x-1)^2}{25/4} - \frac{(y-4)^2}{75/4} = 1$ b.

$\frac{(x+1)^2}{25/4} - \frac{(y+4)^2}{75/4} = 1$ c.

$\frac{(x-1)^2}{75/4} - \frac{(y-4)^2}{25/4} = 1$ d. none of these

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71. The length of the straight line $x - 3y = 1$ intercepted by the hyperbola $x^2 - 4y^2 = 1$ is a. $\frac{6}{\sqrt{5}}$ b. $3\sqrt{\frac{2}{5}}$ c. $6\sqrt{\frac{2}{5}}$ d. none of these

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72. The latus rectum of the hyperbola $16x^2 - 9y^2 = 144$ is a.$16/3$ b. $32/3$ c. $8/3$ d. $4/3$

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73. The foci of the hyperbola $2x^2 - 3y^2 = 5$ are a.$\left(\pm 5\sqrt{6}, 0 \right)$ b. $(\pm 5/6, 0)$ c. $\left(\pm \sqrt{5}/6, 0 \right)$ d. none of these

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74. The eccentricity of the hyperbola $x = \frac{a}{2}\left(t + \frac{1}{t}\right), y = \frac{a}{2}\left(t - \frac{1}{t}\right)$ is a. $\sqrt{2}$. b. $\sqrt{3}$ c. $2\sqrt{3}$ d. $3\sqrt{2}$

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75. The equation of the hyperbola whose centre is $(6, 2)$ one focus is $(4, 2)$ and of eccentricity 2 is (A) $3(x-6)^2 - (y-2)^2 = 3$ (B) $(x-6)^2 - 3(y-2)^2 = 1$ (C) $(x-6)^2 - 2(y-2)^2 = 1$ (D) $2(x-6)^2 - (y-2)^2 = 1$

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76. The locus of the point of intersection of the lines

$\sqrt{3}x - y - 4\sqrt{3}\lambda = 0 \, and \, \sqrt{3}\lambda x + \lambda y - 4\sqrt{3} = 0$

is a hyperbola of eccentricity a.1 b. 2 c. 3 d. 4

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