MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

HYPERBOLA

Sovled Problems

1. Find the centre eccentricity, foci, directrices and length of the lotus rectum of the

hyperbolas.

$4x^2 - 9y^2 - 8x - 32 = 0$

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2. Find the centre eccentricity, foci, directrices and length of the lotus rectum of the hyperbolas.

$4(y+3)^2 - 9(x-2)^2 = 1$

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

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4. If the line $lx+my+n=0$ s a tangent to the hyperboal $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, then show that $a^2l^2-b^2m^2=n^2$

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5. If the $lx + my = 1$ is a normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then shown that $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \left(a^2 + b^2\right)^2$

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6. Find the equation of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are (i) Parallel and (ii) perpendicular to the line $y = x - 7$

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7. Find the equation of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are Perpendicular to the line $y = x - 7$

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8. Prove that the points of intersection of two perpendicular tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ lies on the circle $x^2 + y^2 = a^2 - b^2$

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9. A circle cuts the rectangular hyperbola $xy = 1$ in the points $(x_1, y_1), r = 1, 2, 3, 4.$

Prove that $x_1x_2x_3x_4 = y_1y_2y_3y_4 = 1$

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Exercise 5 A

1. One focus of a hyperbola is located at the point (1,-3) and the corresponding directrix is

the line y=2. Find the equation of the hyperbola if its eccentricty is $\frac{3}{2}$.

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2. If the lines $3x - 4y = 12$ and $3x + 4y = 12$ meets on a hyperbola S=0 then find the eccentricity of the hyperbola S=0

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3. Find the equation of the hyperbola whose foci are $(\pm 5, 0)$ the transverse axis is of length 8.

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4. Find the equation of the hyperbola, whose asymptotes are the straight line $(x + 2y + 3) = 0, (3x + 4y + 5) = 0$ and which passes through the point (1,-1).

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5. If $3x - 4y + k = 0$ is a tangent to $x^2 - 4y^2 = 5$, find value of k.

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6. Find the prodcut of lengths from any point on the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ to its asymptotes.

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7. If the eccentricity of a hyperbola is $\frac{5}{4}$, then find the eccentricity of its conjugate-hyperbola.

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8. Find the equation of the hyperbola whose asymptotes are $3x = +5y$ and the vartices are $(\pm 5, 0)$.

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9. Find the equation of the normal at $\theta = \frac{\pi}{3}$ to the hyperbola $3x^2 - 4y^2 = 12$.

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10. If the angle between the asymptotes is 30° then find its eccentricity.

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11. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$16y^2 - 9x^2 = 144$

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12. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$x^2 - 4y^2 = 4$

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13. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$5x^2 - 4y^2 + 20x + 8y = 4$

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14. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum

of the hyperbola.

$9x^2 - 16y^2 + 72x - 32y - 16 = 0$

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15. Find the equation of the hyperbola whose foci are (4,2) and (8,2) and ec entricity is 2.

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16. Find the equation of the hyperbola of given length of transvers axis 6 whose vertex bisects

of the distance between the centre and the focus.

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17. Find the equation of the tangents to the hyperbola $x^2 - 4y^2 = 4$ which are parallel and perpendicular to the line x+2y=0

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18. Find the equation of the tangents to the hyperbola $x^2 - 4y^2 = 4$ which are Perpendicular to the line $x + 2y = 0$

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19. Find the equation of the tangents drawn to the hyperbola $2x^2 - 3y^2 = 6$ through $(-2, 1)$

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20. Prove that the produt of the perpendicular distacne from any points on a hyperbola to its asymptotes is constant.

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21. Tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ make angle θ_1, θ_2 with transvrse axis of a hyperbola. Show that the points of intersection of these tangents lies on the curve $2xy = k\left(x^2 - a^2\right)$ when $\tan\theta_1 + \tan\theta_2 = k$

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22. Show that the equation

$$\frac{x^2}{9-c}+\frac{y^2}{5-c}=1 \text{ represents.}$$

A hyperbola if c is any real constant between 5

and 9.

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23. Show that the equation

$$\frac{x^2}{9-c}+\frac{y^2}{5-c}=1 \text{ represents.}$$

An ellipse if 'c' is a real constant less than 5.

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Vsaq

1. Find the equation of the hyperbola whose foci are $(\pm 5, 0)$ the transverse axis is of length 8.

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Saq

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2. Find the equation of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are

Perpendicular to the line $y = x - 7$

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