



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

HYPERBOLA

Solved Examples

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

فبالمصافية المتعدد

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

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3. Find the axes, vertices , foci , exentricity, equations of the directrices and length of the latus rectum of the hyperbola $5y^2 - 9x^2 = 36$.



4. Find the equation of the hyperbola whose centre is (-4, 1), vertex (2,1), and semiconjugate axis equal to 4.

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5. Find the equation of the hyperbola whose (i) foci are $(\pm 3, 0)$ and vertices $(\pm 2, 0)$ (ii) foci are $(0, \pm 8)$ and vertices $(0, \pm 5)$.

6. Find the equation of the hyperbola whose foci

are $(\pm 3,\sqrt{5},0)$ and latus rectum is of length 8.

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7. Find the equation of the hyperbola whose foci,

are $(0, \pm \sqrt{10})$ and which passes through (2,3).

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



intersection of the lines $\sqrt{3}x - y - 4\sqrt{3}k = 0$ and $\sqrt{3}kx + ky - 4\sqrt{3} = 0$, for different values of k, is a hyperbola whose eccentricity is 2.



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11. A(-1, 0) and B(2, 0) are two given points. A point M is moving in such a way that the angle B in the triangle AMB remains twice as large as the angle A. Show that the locus of the point M is hyperbola. Fnd the eccentricity of the а hyperbola.



12. Find the values of k, if the equation $8x^2 - 16xy + ky^2 - 22x + 34y = 12$

respresents an ellipse.

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13. Find the equation of the tangent to the parabola $y^2 = 12x$ which makes an anlge of 60° with the x-axis.

14. Prove that the locus of the foot of the perpendicular drawn from the focus of the parabola $y^2 = 4ax$ upon any tangent to its is the tangent at the vertex.

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15. Fnd the equation of the tangent to the ellipse

 $rac{x^2}{16}+rac{y^2}{9}=1$ which makes an angle of 30° with the x-axis.



16. Find the equation of the tangents of the hyperbola $4x^2 - 9y^2 = 36$, which are parallel to the line 5x - 3y = 2.

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17. Prove that the straight line 5x + 12y = 9 touches the hyperbola $x^2 - 9y^2 = 9$ and find the point of contact.

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

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2. Find the equation to the hyperbola whose eccentiricity is 2, whose focus is (2, 0) and whose directrix is x - y = 0.

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

is



4. Find the equation of the hypeerbola whose axes are along the coordinate axes and which

passes through (-3, 4), and (5, 6)





7. Find the coordinate of the foci, coordinate of the vertices, eccentricity and the length of the

latus rectum of the hyperbola

 $16x^2 - 9y^2 = 576$



8. Find the coordinate of the foci, vertice eccentricity and the length of the latus rectum of the hyperbola

$$rac{y^2}{9} - rac{x^2}{27} = 1$$

9. Find the coordinate of the foci, vertices, eccentricity and the length of the latus rectum of the hyperbola

$$9y^2 - 4x^2 = 36$$

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10. Find the coordinate of the foci, vertice eccentricity and the length of the latus rectum of the hyperbola

 $49y^2 - 16x^2 = 784$

11. In the hyperbola $x^2 - y^2 = 4$, find the length of the axes, the coordinates of the foci, the ecentricity, and the latus rectum, and the equations of the directrices.

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12. Find (a) the eccentricities, (b) the co-ordinates of the foci (c)the equations of the directricies of the following hyperbolas



13. Find the equation of the hyperbola, referred to

its axes as the axes of coordinates,

Whose transverse and conjugate axes in length

respectively 2 and 3,



14. Find the equation of the hyperbola, referred to its axes as the axes of coordinates, whose foci are (2,0) and (-2,0) and eccentricity equal to $\frac{3}{2}$,



15. Find the equation of the hyperbola, referred to

its axes as the axes of coordinates,

the distance between whose foci is 4 and whose

eccentricity is $\sqrt{2}$,



16. Find the equation of the hyperbola, referred to

its axes as the axes of coordinates,

whose conjugate axis is 3 and the distance between whose foci is 5,

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Exercise 25 B

1. Find the tangent to the $y^2 = 16x$, making of

 $45^{\,\circ}$ with the x-axis.



2. A tangent to the parabola $y^2 = 16x$ makes an angle of 60° with the x-axis. Find its point of contact.

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3. Find the equations of the tangents to the parabola $y^2 = 6x$ which pass through the point $\left(\frac{3}{2}, 5\right)$.

4. Find the equations of the tangents of the parabola $y^2 + 12x = 0$ from the point (3, 8)

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5. Show that the line 12y - 20x - 9 = 0 touches the parabola $y^2 = 5x$.

6. Show that the line x + y = 1touches the

parabola $y = x - x^2$.

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7. Show that the line $x + ny + an^2 = 0$ touches the parabola $y^2 = 4ax$ and find the point of contact.

8. Find the tangents to the ellipse $x^2 + 9y^2 = 3$, which are (i) parallel (ii) perpendicular to the line 3x + 4y = 9.



9. Find the equations of the tanggents to the ellipse $rac{x^2}{2}+rac{y^2}{7}=1$ that make an angle of 45°

with the x-axis.





11. Find the value of 'c' so that 2x-y+c=0 may touch the ellipse $x^2+y^2=2.$

12. Show that the line lx + my = 1 will touch the

ellipse
$$rac{x^2}{a^2} + rac{y^2}{b^2} = 1$$
 if $a^2 l^2 + b^2 m^2 = 1.$

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13. Show that the line are tangent to the given hyperbolas and dectermine the points of contact. $x+1=0, \, 4x^2-3y^2=4$



14. Show that the line are tangent to the given hyperbolas and determine the points of contact.

$$x - 2y + 1 = 0, x^2 - 6y^2 = 3$$

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15. Find the equations of the tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are mutually perpendicular, show that the locus of P is the circle $x^2 + y^2 = a^2 - b^2$.

16. Show that the straight line x + y = 1 touches the hyperbola $2x^2 - 3y^2 = 6$. Also find the coordinates of the point of contact.



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1. Find the eccentricity and the coordinate of foci of the hyperbola $25x^2 - 9y^2 = 225$.

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3. From the following information, find the equation of the hyperbola. Focus (-2, 1), Directrix: 2x - 3y + 1 = 0, $e = \frac{2}{\sqrt{3}}$

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4. Find the equation of the hyperbola whose centre is at the origin, transverse axis along x axis, eccentricity is $\sqrt{5}$ and the sum of whose semi-axes is 9.



5. Find the equation of the hyperbola whose foci

are (4, 1), (8, 1) and whose eccentricity is 2.



7. Find the equation of the hyperbola whose foci are $(0,\ \pm 13)$ and the length of the conjugate





8. Find the equation of the hyperbola whose transverse and conjugate axes are the x and y axes respectively, given that the length of conjugate axis is 5 and distance between the foci is 13.



9. Find the equation the conic whose focus is (1, -1) eccentricity is $\frac{1}{2}$ and the directrix is the line x - y = 3. Is the conic section an ellipse ?