MATHS

BOOKS - NAGEEN PRAKASHAN ENGLISH

CONIC SECTION

Solved Example

1. Find the equation of a circle whose centre is (2, 3) and radius is 5.

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2. Find the centre and radius of the circle $(x-2)^2 + (y+5)^2 = 49$

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3. Find the centre and radius of the circle $(x + 2)^2 + (y + 3)^2 = 5$

A. $(-2, -3)$ and $\sqrt{5}$

B. $(2, 3)$ and $\sqrt{5}$

C. $(-3, -2)$ and 5

D. none of these

Answer: A

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4. Find the equation of a circle which touches the X-axis and whose centre is (2,3).

A. $(x - 2)^2 + (y - 3)^2 = 3^2$

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

C. $(x - 2)^2 + (y - 1)^2 = 2^2$

D. none of these

Answer: A

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5. Find the radius and centre of the circle of the circle $x^2 + y^2 + 2x + 4y - 1 = 0$.

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6. Find the centre and radius of the circle $3x^2 + 3y^2 - 6x + 9y - 8 = 0$.

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7. Find the equation of a circle which passes through the origin and whose centre is (a, b).

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8. Prove that the radii of the circles $x^2 + y^2 = 1$, $x^2 = y^2 - 2x - 6y = 6$ and $x^2 + y^2 - 4x - 12y = 9$ are in AP.

9. Prove that the circle $x^2 + y^2 + 2x + 2y + 1 = 0$ and circle $x^2 + y^2 - 4x - 6y - 3 = 0$ touch each other.

10. Find the equation of a circle which passes through the point (3, 2) and concentric with the circle $x^2 + y^2 - 4x + 2y - 1 = 0$.

11. Find the equation of a circle which passes the centre of the circle $x^2 + y^2 - 6x = 1$ and concentric with the circle

$$2x^2 + 2y^2 - 8x + 12y - 1 = 0.$$

12. Find the equation of a circle, the co-ordinates of the ends of whose diameter are $(-1, -3)$ and $(2, 5)$

13. In $\triangle ABC$, $\angle A = 90°$ and the co-ordinates of points B and C are $(2, -4)$ and $(1, 5)$. Find the equation of the circumcircle of $\triangle ABC$.

14. PQRS is a square of side 'b'. Prove that the equation of circumcircle of square PQRS, where PQ and PS are the axes, is $x^2 + y^2 = b(x + y)$.

15. $y = 2x$ be a chord of the circle $x^2 + y^2 = 20x$. Find the equation of a circle whose diameter is this chord.

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16. Find the equation of circle of a circle which passes through the points $(0, -6), (1, 1)$ and $(7, -7)$.

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17. Find the equation of the circle passing through the points $(1, -2) and (4, -3)$ and whose centre lies on the $3x + 4y = 7$.

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18. Find the equation of circumcircle of the triangle whose sides are $2x + y = 4, x + y = 6$ and $x + 2y = 5$.

19. Find the parametric equations of the circles $x^2 + y^2 = 16$.

20. Find the position of the point $(-2, 3)$ with respect to the circle $x^2 + y^2 = 25$.

21. Find the equation of a circle, the equation of whose two diameters are $x + y = 6$ and $3x + 4y = 16$ and radius is 10.

22. If two circle $x^2 + y^2 + 2gx + 2fy = 0$ and $x^2 + y^2 + 2g'x + 2f'y = 0$ touch each

other then proove that f'g =fg'.

23. Find the length of chord cut on x-axis from the circle $x^2 + y^2 - 5x - 2y + 6 = 0$.

24. Find the vertex , focus, axis, directrix and latus rectum of the following parabola: $y^2 = 8x$

25. Find the equation of parabola whose focus is (2,0) and equation of directrix is x=-2.

26. Find the equation of a parabola whose focus and vertex are (0, 0) and (0, 2) respectively.

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27. Find the vertex, focus, axis , latus rectum and directrix of the parabola $y^2 + 4x + 6y + 17 = 0$

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28. The focal distance of a point of a parabola $y^2 = 8x$ is 5. Find the abscissa of that point.

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29. Find the equation of a line joining the vertex of parabola $y^2 = 8x$ to its upper end of latus rectum.

30. Find the equation of a parabola whose vertex is (-2,0) and focus is (0,0).

31. Find the equation of the parabola whose Focus is (2,-3) and directrix is x+4=0.

32. Find the equation of a parabola whose focus is (-8,-2) and equation of directrix is y=2x-9.

33. If the co-ordinates of one end of a focal chord of a parabola y^2=4ax are $(at^2, 2at)$, find the co-ordinates of its other end.

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34. Show that the parametric point $(2 + t^2, 2t + 1)$ represents a parabola. Show that its vertex is (2,1).

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35. If the parabola $y^2 = 4ax$ passes through the (4,-8) then find the length of latus rectum and the co-ordinates of focus.

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36. Show that the locus of the mid-points of all chords passing through the vertices of the parabola y^2=4ax is the parabola $y^2 = 2ax$.

37. Find the equation of that focal chord of the parabola $y^2 = 8x$ whose mid-point is (2,0).

38. Find the equation of the ellipse whose major axis is 8 and minor axis is 4.

39. Find the co-ordinates of vertices, length of major and minor axes, eccentricity, co-ordinates of foci, equation of directrices and length of latus rectum for each of the following ellipse :

(i) $\dfrac{x^2}{49} + \dfrac{y^2}{25} = 1$

(ii) $\dfrac{x^2}{4} + \dfrac{y^2}{9} = 1$

40. Find the equation of ellipse whole foci are $(\pm 1, 0)$ and eccentricity is $\dfrac{1}{3}$.

41. Find the equation of the ellipse whose vertices are $(\pm 13, 0)$ and foci are $(\pm 5, 0)$.

42. Find the equation of ellipse whose vertices are $(0, \pm 13)$ and foci $(0, \pm 5)$.

43. Find the equation of the ellipse whose major axis is 8 and co-ordinates of foci are $(\pm 2, 0)$

44. Find the equation of the ellipse whose focus is (5,6), equation of directrix x+y+2=0 and eccentricity is $\frac{1}{2}$.

45. Find the equation of the ellipse whose centre is at origin, focus is (0,4) and major axis is 10.

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

47. Find the equation of the ellipse whose centre is at origin, the distance between foci is 2 and eccentricity is $\dfrac{1}{\sqrt{2}}$.
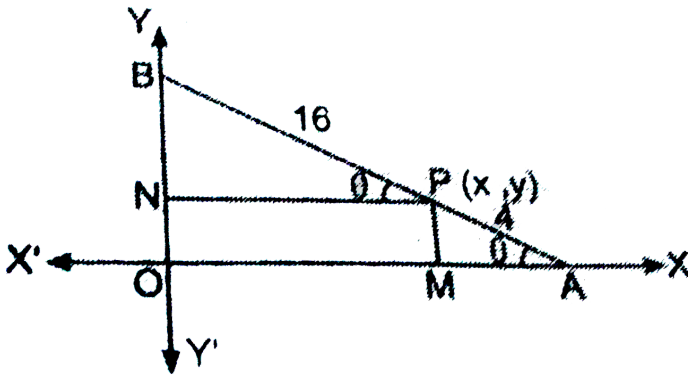
48. Prove that the curves x=4 $(\cos\theta + \sin\theta)$ and y=3 $(\cos\theta - \sin\theta)$ represents an ellipse.

49. The ends of 20 cm long rod moves on two mutually perpendicular lines. If a point on this rod at 4 cm distance from end then from the

eccentricity of the ellipse formed by moving that point.

50. If e_1 and e_2 be the eccentricities of the ellipses $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ and $\dfrac{x^2}{a^2} + \dfrac{4y^2}{b^2} = 1$ respectively then prove that $3 = 4e_2^2 - e_1^2$.

51. Find the equation of the hyperbola whole transverse and conjugate axes are 8 and 6 respectively.

52. Find the vertices, eccentricity foci, rquation of directrices and length of latus rectum of the hyperbola $9x^2 - 25y^2 = 225$.

53. Find the vertices, eccentricity, foci, equation of directrices length of latus rectum for the hyperbola $3y^2 - x^2 = 27$.

54. Find the equation of hyperbola whose vertices are $(0, \pm 5)$ and focii are $(0, \pm 10)$

55. find the equation of hyperabola where foci are (0,12) and (0,-12)and the length of the latus rectum is 36

56. Find th equation of the hyperbola eccentricity is 2 and the distance between foci 16.

57. Find the equation of the hyperbola whose focus is (1,1), eccentricity is 2 and equation of directrix is x+y+1=0.

58. The difference of the distances of variable point from two given points (3,0) and (-3,0) is 4. Find the locus of the point.

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

Miscellaneous Example

1. A parabola reflector is 15 cm deep and its focus is at a distance of 5 cm from its vertex. Find the diameter of the reflector.

2. A rod AB of length $15 cm$ rests in between two coordinate axes in such a way that the end point A lies on $x - a\xi s$ and end point B lies on

$y - a\xi s$. A point is taken on the rod in such a way that $AP = 6cm$.

Show that the locus of P is an ellipse. Also find its eccentricity.

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3. A beam is supported at its ends by supports which are 12 metres apart. Since the load is concentrated at its centre, there is a deflection of 3 cm at the centre and the deflected beam is in the shape of a parabola. How far from the centre is the

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Exercise 11 A

1. Find the equation of circle whose :

(i) radius is 5 and centre is (3,4).

(ii) radius is $\sqrt{5}$ and centre is (0.2).

(iii) radius is $\sqrt{a^2 + b^2}$ and centre is (a,b).

(iv) radius is r and centre is $(r\cos\theta, r\sin\theta)$.

(v) radius is $\sqrt{a^2\sec^2\theta + b^2\tan^2\theta}$ and centre is $(a\sec\theta, b\tan\theta)$.

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2. Find the centre and radius radius of the following circles :

(i) $(x-1)^2 + (y+2)^2 = 16$

(ii) $(x+2)^2 + y^2 = 25$

(iii) $(x+p)^2 + (y+q)^2 = p^2 + q^2$

(iv) $x^2 + y^2 = 7$

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3. Find the equation of a circle passes through the origin and whose centre is (-2,5).

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4. (i) Find the equation of a circle passes through the point (4,3) and whose centre is (-3,2).

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5. Find the equation of a circle passes through the point (1,-1) and whose centre is at origin.

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6. Find the equation of a circle which touches the X-axis and whose centre is $(a \sin \theta, a \cos \theta)$.

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7. Find the equation of a circle which touches the Y-axis and whose centre is (3,0).

8. (i) Find the equation of a circle which touches both the axes and whose centre is (2,2).

(ii) Find the equation of a circle, touching the lines x=0, y=0 and x=6.

9. Find the centre and radius of each of the following circle :

(i) $x^2 + y^2 + 4x - 4y + 1 = 0$

(ii) $2x^2 + 2y^2 - 6x + 6y + 1 = 0$

(iii) $2x^2 + 2y^2 = 3k(x + k)$

(iv) $3x^2 + 3y^2 - 5x - 6y + 4 = 0$

(v) $x^2 + y^2 - 2ax - 2by + a^2 = 0$

10. Find the diameter of the circle $2x^2 + 2y^2 - 6x - 9 = 0$.

11. Prove that the radii of the circles

$x^2 + y^2 = 1, x^2 + y^2 - 2x - 4y - 11 = 0$ and $x^2 + y^2 - 4x - 6y - 243 =$

are in G.P.

12. Show that the circles $x^2 + y^2 - 10x + 4y - 20 = 0$ and

$x^2 + y^2 + 14x - 6y + 22 = 0$ touch each other. Find the coordinates of

the point of contact and the equation of the common tangent at the

point of contact.

13. Prove that the circles

$x^2 + y^2 + 2ax + ay - 3a^2 = 0$ and $x^2 + y^2 - 8ax - 6ay + 7a^2 = 0$

touch each other.

14. If the circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2by + c = 0$ touch each other then show that $\dfrac{1}{a^2}, \dfrac{1}{2c}, \dfrac{1}{b^2}$ are in A.P.

15. (i) Find the point at which the circle $x^2 + y^2 - 5x + 2y + 6 = 0$, meets the X-axis.

16. (i) Find the equation of a circle concentric with the circle $x^2 + y^2 - 8x + 6y - 10 = 0$ and passes through the point (-2,3).

(ii) Find the equation of circle concentric with the circle $x^2 + y^2 - 4x - 8y - 6 = 0$ and whose radius is three times the radius of this circle.

17. Find the distance between the centres of the circles $x^2 + y^2 + 8x + 10y - 2 = 0$ and $x^2 + y^2 + 2x + 2y - 1 = 0.$

18. Find the equations of the circles the end points of whose diameter are as follows :

(i) (0,6) and (6,0)

(ii) (-1,3) and (2,4)

(iii) (A+b,a-b) and (a-b,a+b)

(iv) (0,0) and (2,2)

19. The end points of a diameter of a circle are (1,-1) and (3,5). Find the equation of the circle. Also find its centre and radius.

20. Find the equation of a circle passes through the origin and cuts 'a' intercept on the positive parts of the axes.

21. Show that equations of a circle with end points of diameter (x_1, y_1) and (x_2, y_2) is same as the equation of circle with end points of diameter (x_1, y_2) and (x_2, y_1). Give reason.

22. Find the equation of a circle whose centre is (2,-1) and touches the line x-y-6=0.

23. Find the equation of circle with Centre C (1,- 3) and tangent to 2 x -y - 4 = 0.

24. Find the equation of circle passing through the point $(2, 1)$, $(1, 2)$ and$(8, 9)$.

25. Find the equation of the circle which passes through the points $(3, -2) and(-2, 0)$ and the center lies on the line $2x - y = 3$

26. Find the equation of the circle passing through the points $(1, -2) and(4, -3)$ and whose centre lies on the $3x + 4y = 7$.

27. Find the equation of circle passing through the points (0,5) and (6,1) and whose centre lies on the line 2x+5y=25.

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28. Find the equation of circle passing through the points (1,-2) and (3,-4) and touches the X-axis.

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29. Find the equation of a circle circumscribing the triangle whose sides are 2x+y-3=0, 3x-y-7=0 and x-2y+1=0.

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30. Find the equation of a circle passing through the points (-1,5) and (-7,5) and its centre lies on the line 3x+4y+8=0.

31. (i) Find the equation a circle passing through the point $(2 + 3\cos\theta, 1 + 3\sin\theta)$ where $'\theta'$ is a parameter.

(ii) Prove that the equations $x = a\cos\theta + b\sin\theta$ and $y = a\sin\theta - b\cos\theta$ represents a circle.

32. Find the parametic equation of the circle $x^2 + y^2 = 25$ in terms of parameter $'\theta'$.

33. Find the position of the point (3,-4) with respect to the circle $x^2 + y^2 = 36$.

34. Find the position of the point (1,-2) with respect to the circle $x^2 + y^2 + 4x - 2y - 1 = 0$.

35. Find the co-ordinates of the mid-point of the chord intersect by the lime x-y+2=0 and the circle $x^2 + y^2 + 4x - 2y = 0$.

36. If $y = 2x$ is a chord of the circle $x^2 + y^2 - 10x = 0$, find the equation of a circle with this chord as diameter.

37. The abscissae of two points A and B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and their ordinates are the roots of the equation $x^2 + 2px - q^2 = 0$. Find the equation and the radius of the circle with AB as diameter.

Exercise 11 B

1. Find the equation of that parabol whose :

(i) vertex is (0,0) and focus is (1,0).

2. Find the vertex and axis of the parabola $x^2 - 4x - 3y + 7 = 0$.

3. Find the point on the parabola $y^2 = 18x$ at which ordinate is 3 times its abscissa.

4. Find the point on the parabola $y^2 = 12x$ at which ordinate is 3 times its abscissa.

5. The equations of the parabolas the extremities of whose latus rectum are $(3, 5)$ and $(3, -3)$

6. Find the coordinates of a point on the parabola $y^2 = 8x$, whose focal distance is 4

7. Find the co-ordinates of the points lying on parabola $y^2 = 16x$ whose focal distance is 8.

8. Find the co-ordinates of the points lying on parabola $x^2 = 12y$ whose focal distance is 15.

9. If the parabola $y^2 = 4ax$ passes through the point (2,-3) then find the co-ordinates of the focus and the length of latus rectum.

10. Prove that the locus of mid-point of focal chords of parabola $y^2 = 4ax$ is $y^2 = 2a(x - a)$.

11. Show that $y = ax^2 + bx + c$ represents a parabola.

Also find equation its axis.

12. Find the length of latus rectum of the parabola $x^2 = 4x - 4y$.

13. Show that the equation

$$\frac{1}{x+y-a} + \frac{1}{x-y+a} + \frac{1}{y-x+a} = 0$$

represents a parabola.

14. Find the position of the following points with respect to the parabola

$$y^2 = 16x$$

(i) (4,-8) , (ii) (2,4)

(iii) (0,1) , (iv) (-2,8)

15. Prove that the equation of the parabola whose vertex and focus are on the X-axis at a distance a and a'from the origin respectively is

$$y^2 = 4(a' - a)(x - a)$$

16. Find the equation of that focal chord of the parabola $y^2 = 8x$ whose mid-point is (2,0).

17. Find the area of the triangle formed by the vertex and the ends of the latus rectum of the parabola $x^2 = -36y$.

18. If the point $(at^2, 2at)$ be the extremity of a focal chord of parabola $y^2 = 4ax$ then show that the length of the focal chord is $a\left(t + \dfrac{1}{t}\right)^2$.

19. Prove that the semi-latusrectum of the parabola $y^2 = 4ax$ is the harmonic mean between the segments of any focal chord of the parabola.

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Exercise 11 C

1. Convert the following equation of ellipse into standard from .

(i) $16x^2 + 9y^2 = 144$

(ii) $9x^2 + 25y^2 = 225$

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2. Find the equation of the ellipse whose co-ordinate of focus are (6,7), equation of directrix x+y+1= and eccentricity is $\dfrac{1}{\sqrt{2}}$.

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3. Find the eqation of the ellipse whose co-ordinates of focus are (3,2), eccentricity is $\dfrac{2}{3}$ and equation of directrix is 3x+4y+5=0.

4. Find the equation of the ellipse whose co-ordinates of focus are (1,2), eccentricity is $\dfrac{1}{3}$ and equation of directrix is x+5y=6.

5. Find the equation of the ellipse whose foci are $(\pm 4, 0)$ and eccentricity is $\dfrac{1}{3}$.

6. Find the equation of the ellipse whose foci are $(0, \pm 3)$ and eccentricity is $\dfrac{3}{5}$.

7. Find the equation of the ellipse whose vetices are ($\pm\, 6, 0$) and foci are ($\pm\, 4, 0$).

8. Find the equation of the ellipse whose vertices are $(0, \,\pm\, 4)$ and foci are $(0, \,\pm\, 3)$.

9. Find the equation of the ellipse whose vertices are ($\pm\, 2, 0$) and foci are ($\pm\, 1, 0$).

10. Find the equation of the ellipse whose major axis is 12 and foci are $(\pm 4, 0)$.

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11. If the eccentricity is zero, prove that the ellipse becomes a circle.

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12. Find the equation of the ellipse whose foci are $(\pm 2, 0)$ and eccentricity is $\dfrac{1}{3}$.

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13. Find the equation of the ellipse whose foci are $(0, \pm 1)$ and eccentricity is $\dfrac{1}{2}$.

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14. Find the equation of the ellipse whose foci are $(\pm 3, 0)$ and it passes through the point $\left(2, \sqrt{7}\right)$.

15. Find the eccentricity of the ellipse whose latus rectum is (i) half its major axis, (ii) half its minor axis.

16. Find the equation of the ellipse which passes through the points (3,1) and (2,2).

17. Find the eccentricity of the ellipse whose latus rectum is one third of the major axis.

18. find the equation of the ellipse refer refer to it Centre whose major axis is equal to distance between the foci and latus rectum is 10.

19. The ends of 20 cm rope are at two points 16 cm apart. Find the eccentricity and latus rectum of ellipse formed by the variablepoint at which the rope is tighten.

20. A rod AB of length 30 cm moves such that its ends always touching the co-ordinate axes. Determine the locus of a point C of the rod if AC : BC = 2 : 1

21. Show that the point (9,4) lies outside the ellipse
$$\frac{x^2}{10} + \frac{y^2}{9} = 1$$

22. If the focal distance of one ed of minor axis of an ellipse is k and distance betwnn foci is 2h then find the equation of the ellipse.

Exercise 11 D

1. Find the equation of hyperbola whose transverse axis is 10 conjugate axis is 6.

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

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

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

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

6. (i) Find the eccentricity of hyperbola whose latus rectum is half of its transverse axis.

(ii) Prove that the straight lines $\dfrac{x}{a} - \dfrac{y}{b} = m$ and $\dfrac{x}{a} - \dfrac{y}{b} = \dfrac{1}{m}$ always meet at a hyperbola, where 'm' is a constant.

7. If the locus of the point which moves so that the difference (p) 0 of its distance from the points $(5, 0)$ and $(-5, 0)$ is 2 is $\dfrac{x^2}{a^2} - \dfrac{y^2}{24} = 1$ then a is

8. Find the equation of the hyperbola whose foci are $(0, \pm 4)$ and latus rectum is 12.

9. Find the equation of the hyperbola whose vertices are $(\pm 2, 0)$ and eccentricity is $\dfrac{3}{2}$.

10. Find the eccentricity of hyperbola $x^2 - 9y^2 = 1$.

11. Find the equation of hyperbola which passes through the point (-3,2) and its conjugate axis is 8.

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

13. (i) Find the equation of hyperbola whose eccentricity is $\sqrt{\dfrac{13}{12}}$ and the distance between foci is 26.

(ii) The foci of a hyperbola coincide of the ellipse $9x^2 + 25y^2 = 225$. If the eccentricity of the hyperbola is 2, then find its equation.

14. If the eccentricity of the hyperbola $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$ and $\dfrac{y^2}{b^2} - \dfrac{x^2}{a^2} = 1$ are e_1 and e_2 respectively then prove that : $\dfrac{1}{e_1^2} + \dfrac{1}{e_2^2} = 1$

Exercise 11 E

1. The focus of a parabolic mirror as shown in figure is at a distance of 5 cm from its vertex. If the mirror is 45 cm deep, find the distance AB

2. A parabola reflector is 9 cm deep and its diameter is 24 cm. Find the distance of its focus from vertex.

3. 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.

4. 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.

5. The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100m long is supported by vertical wires attached to the cable, the longest wire being 30m and the shortest being 6m. Find the length of the supporting wire attached to the roadway 18m from the middle.

Exercise 11 F

1. The parametric point on the circle $x^2 + y^2 = a^2$ is :

A. $(a \cos \theta, \, a \sin \theta)$

B. $(a \cos \theta, \, b \sin \theta)$

C. $(b \cos \theta, \, a \sin \theta)$

D. None of these

Answer: A

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2. Find the equation of the circle passing through (0, 0) and making intercepts a and b on the coordinate axes.

A. $x^2 + y^2 + ax + by = 0$

B. $x^2 + y^2 - ax - by = 0$

C. $x^2 + y^2 + ax - by = 0$

D. $x^2 + y^2 - ax + by = 0$

Answer: B

3. The co-ordinates of the end points of a diameter of a circle are (0,0) and (4,4). The equation of the circle is :

A. $x^2 + y^2 - 8x - 8y = 0$

B. $x^2 + y^2 + 8x + 8y = 0$

C. $x^2 + y^2 + 4x + 4y = 0$

D. $x^2 + y^2 - 4x - 4y = 0$

Answer: D

4. The co-ordinates of a point on the parabola $y^2 = 8x$ whose ordinate is twice of abscissa, is :

A. (2,4)

B. (-2,4)

C. (-2,-4)

D. None of these.

Answer: A

5. If the vertex of a parabola is (0,2), directrix on x-axis then its focus is :

A. (0,0)

B. (0,4)

C. (4,0)

D. None of these.

Answer: B

6. The latus rectum of an ellipse is half of its minor axis. Its eccentricity is :

A. $\dfrac{1}{4}$

B. $\dfrac{\sqrt{3}}{4}$

C. $\dfrac{1}{2}$

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

Answer: D

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7. The vertex of ellipse $\dfrac{x^2}{16} + \dfrac{y^2}{25} = 1$ are :

A. $(\pm 5, 0)$

B. $(\pm 4, 0)$

C. $(0, \pm 5)$

D. $(0, \ \pm 4)$

Answer: C

8. The equation of hyperbola whose foci and vertices are $(0, \ \pm 18)$ and $(0, \ \pm 9)$ respectivelty, is :

A. $x^2 - 3y^2 = 243$

B. $3x^2 - y^2 = 243$

C. $3y^2 - x^2 = 243$

D. $y^2 - 3x^2 = 243.$

Answer: C

9. If the locus of the point which moves so that the difference (p) 0 of its distance from the points $(5, 0)$ and $(-5, 0)$ is 2 is $\dfrac{x^2}{a^2} - \dfrac{y^2}{24} = 1$ then a is

10. Write the length of the intercept made by the circle $x^2 + y^2 + 2x - 4y - 5 = 0$ on y-axis.

A. 6 units

B. 8 units

C. 10 units

D. None of these

Answer: A

1. If a line is drawn through a fixed point $P(\alpha, \beta)$ to cut the circle $x^2 + y^2 = a^2$ at A and B , then find the value of PA. PB

    A. $(\alpha - \beta)^2 + r^2$

    B. $\alpha^2 + \beta^2 - r^2$

    C. $(\alpha + \beta)^2 + r^2$

    D. None of these

Answer: B

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2. A circle passes through $(0, 0)$ and $(1, 0)$ and touches the circle $x^2 + y^2 = 9$ then the centre of circle is -

    A. $\left(\dfrac{1}{2}, \ -\sqrt{2} \right)$

B. (0,3)

C. (-1,1)

D. None of these

Answer: A

---

3. If the lines 2x-3y=5 and 3x-4y=7 are the diameters of a circle of area 154 square units, then obtain the equation of the circle.

A. $x^2 + y^2 - 2x + 2y - 62 = 0$

B. $x^2 + y^2 - 2x + 2y - 47 = 0$

C. $x^2 + y^2 + 2x - 2y - 47 = 0$

D. $x^2 + y^2 + 2x - 2y - 62 = 0$

Answer: B

4. The circles $x^2 + y^2 - 2x - 4y + 1 = 0$ and $x^2 + y^2 + 4y - 1 = 0$

A. $\dfrac{1}{a^2} = \dfrac{1}{b^2} + \dfrac{1}{c^2}$

B. $\dfrac{1}{b^2} = \dfrac{1}{c^2} + \dfrac{1}{a^2}$

C. $\dfrac{1}{c^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$

D. None of these

Answer: C

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5. If the focus of a parabola is $(3, 3)$ and its directrix is $3x - 4y = 2$ then the length of its latus rectum is

A. 1

B. 2

C. 3

D. 4

Answer: B

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6. If t is the parameter for one end of a focal chord of the parabola $y^2 = 4ax$, then its length is :

A. $a\left(t + \dfrac{1}{t}\right)$

B. $a\left(t - \dfrac{1}{t}\right)$

C. $a\left(t + \dfrac{1}{t}\right)^2$

D. $a\left(t - \dfrac{1}{t}\right)^2$

Answer: C

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7. The co-ordinates of the end points of the latus rectum of a parabola are (3,6) and (-5,6). The co-ordinates of its focus are :

A. (0,0)

B. (1,1)

C. (2,2)

D. None of these.

Answer: C

8. The eccentricity of the curve $x^2 - 4x + 4y^2 = 12$ is

A. $\sqrt{3}$

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

C. $\dfrac{2}{3}$

D. None of these.

Answer: D

---

9. The co-ordinates of a focus of an ellipse is (4,0) and its eccentricity is $\dfrac{4}{5}$

Its equation is :

   A. $25x^2 + 9y^2 = 225$

   B. $9x^2 + 25y^2 = 225$

   C. $16x^2 + 25y^2 = 400$

   D. $25x^2 + 16y^2 = 400$.

Answer: B

---

10. If e and e_1 are the eccentricities of the hyperbola

$xy = c^2$ and $x^2 - y^2 = a^2$, then $(e + e_1)^2$ is equal to

A. $e_1^2 + e_2^2 = 1$

B. $e_1^2 + e_2^2 = 4$

C. $e_1^2 + e_2^2 = 6$

D. $e_1^2 + e_2^2 = 8.$

Answer: B

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Exercise 11 1

1. Find the equation of the circle with centre : (0, 2) and radius 2

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2. Find the equation of the circle with centre : $(- 2, 3)$ and radius 4

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3. Find the equation of the circle with centre : $\left(\dfrac{1}{2}, \dfrac{1}{4}\right)$ and radius $\dfrac{1}{12}$

4. Find the equation of the circle with centre : (1, 1) and radius $\sqrt{2}$

5. Find the equation of the circle with centre : $(-a, b)$ and radius $\sqrt{a^2 - b^2}$.

6. Find the centre and radius of the circles $(x + 5)^2 + (y - 3)^2 = 36$

7. Find the centre and radius of the circles $x^2 + y^2 - 4x - 8y - 45 = 0$

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8. Find the centre and radius of the circles $x^2 + y^2 - 8x + 10y - 12 = 0$

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9. Find the centre and radius of the circles $2x^2 + 2y^2 - x = 0$

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10. Find the equation of the circle passing through the points (4,1) and (6,5) and whose centre lies on the line 4x+ y = 16.

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11. Find the equation of circle passing through the point (2,3) and (-1,1) and whose centre is on the line x - 3y - 11 = 0

12. Find the equation of the circle with radius 5 whose center lies on the x-axis and passes through the point (2, 3).

13. Find the equation of the circle passing through (0, 0) and making intercepts a and b on the coordinate axes.

14. Find the equation of a circle with centre (2, 2) and passes through the point (4, 5).

15. Does the point $(2.5, \quad 3.5)$ lie inside, outside or on the circle $x^2 + y^2 = 25$?

Exercise 11 2

1. For the following parabola find the coordinates of the focus, the equation of the directrix and the length of the latus rectum. $y^2 = 12x$

2. $x^2 = 6y$. Find latus rectum and axis of parabola

3. $y^2 = -8x$ Find latus rectum and directrix of parabola

4. $x^2 = -16y$. Find latus rectum and directrix of parabola

5. $y^2 = 10x$. Find latus rectum and directrix of parabola

6. $x^2 = -9y$. Find latus rectum and axis of parabola

7. The equation of the parabola with the Focus (6,0), directrix x=-6 is

8. The equation of the parabola with the focus (0,-3), directrix y=3 is:

9. Find the equation of parabola having vertex (0,0) and focus (3,0).

10. Find the equation of parabola that satisfies the given condition

Vertex (0,0), focus (-2,0)

11. Find the equation of the parabola that satisfies the given conditions:

Vertex (0,0) passing through (2,3) arid axis is along xaxis.

12. Find the equation of the parabola if its vertex is at $(0, 0)$, passes through $(5, 2)$ and is symmetric w.r.t. y-axis.

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Exercise 11 3

1. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $\dfrac{x^2}{36} + \dfrac{y^2}{16} = 1$

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2. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $\dfrac{x^2}{4} + \dfrac{y^2}{25} = 1$

3. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $\dfrac{x^2}{16} + \dfrac{y^2}{9} = 1$

4. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $\dfrac{x^2}{25} + \dfrac{y^2}{100} = 1$

5. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $\dfrac{x^2}{49} + \dfrac{y^2}{36} = 1$

6. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $\dfrac{x^2}{100} + \dfrac{y^2}{400} = 1$

7. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $36x^2 + 4y^2 = 144$

8. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse. $16x^2 + y^2 = 16$

9. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse.$4x^2 + 9y^2 = 36$

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10. Find the equation of the ellipse that satisfies the given conditions: Vertices $(\pm 5, 0)$, foci $(\pm 4, 0)$

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11. Find the equation for the ellipse that satisfies the given conditions:Vertices $(0, \pm 13)$, foci $(0, \pm 5)$

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12. Find the equation of the ellipse that satisfies the given conditions: Vertices $(\pm 6, 0)$, foci $(\pm 4, 0)$

13. Find the equation of the ellipse that satisfies the given conditions: Ends of major axis $(\pm 3, 0)$, ends of minor axis $(0, \pm 2)$.

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

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

16. Find the equation of the ellipse that satisfies the given conditions:

Length of minor axis 16, foci (0 ± 6).

17. Find the equation of the ellipse that satisfies the given conditions:

Foci $(\pm 3, 0)$, $a = 4$

18. Find the equation for the ellipse that satisfies the given conditions: b = 3, c = 4, centre at the origin; foci on a x axis.

19. Find the equation for the ellipse that satisfies the given conditions: Centre at (0, 0), major axis on the yaxis and passes through the points (3, 2) and (1, 6).

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20. If Major axis on the x-axis and passes through the points (4,3) and (6,2). then the equation foe ellipse whose center is origin is satisfies the given condition

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Exercise 11 4

1. Find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas.$\dfrac{x^2}{16} - \dfrac{y^2}{9} = 1$

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

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

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3. 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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4. Find the coordinates of the foci, the vertices, the eccentricity and the length of the latus rectum of the Hyperbola $16x^2 - 9y^2 = 576$

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5. Find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas. $5y^2 - 9x^2 = 36$

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

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

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7. 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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8. In each of the following find the equations of the hyperbola satisfying he given condition: vertices $(0, \pm 5)$ ficu $(0, \pm 8)$

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9. 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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10. Find the equations of the hyperbola satisfying the given conditions :Foci $(\pm 5, 0)$, the transverse axis is of length 8.

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11. Find the equations of the hyperbola satisfying the given conditions :Foci $(0, \pm 13)$, the conjugate axis is of length 24.

12. Find the equations of the hyperbola satisfying the given conditions :Foci $\left(\pm 3\sqrt{5}, 0 \right)$, the latus rectum is of length 8.

13. Find the equations of the hyperbola satisfying the given conditions :Foci $\left(\pm 4, 0 \right)$, the latus rectum is of length 12

14. Find the equations of the hyperbola satisfying the given conditions :Vertices $\left(\pm 7, 0 \right), e = \dfrac{4}{3}$

15. Find the equations of the hyperbola satisfying the given conditions :Foci $(0, \pm \sqrt{10})$, passing through (2,3)

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Miscellaneous Exercise

1. If a parabolic reflector is 20 cm in diameter and 5 cm deep, find its focus.

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2. An arc is in the form of a parabola with its axis vertical. The arch is 10 m high and 5 m wide at the base. How high is it 2 m from the vertex of the parabola ?

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3. The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100 m long is supported by vertical wires attached to the cable, the longest wire being 30 m and the shortest being 6 m. Find t

4. 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 $1.5cm$ from one end.

5. 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.

6. Find the area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its latus-rectum.

7. 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.

8. An equilateral triangle is inscribed in the parabola $y^2 = 4ax$ whose vertex is at the vertex of the parabola .Find the length of its side.