MATHS

BOOKS - NAGEEN MATHS (HINGLISH)

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 $X-a\xi s$ and whose centre is $(1,2)$.

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

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

A. $\sqrt{6}$ and $(-1, -2)$

B. $\sqrt{2}$ and $(1, 2)$

C. $\sqrt{7}$ and $(-1, -3)$

D. none of these

Answer: A

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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 $x^2 + y^2 - 4x - 12y - 9 = 0$ are in arithmetic progression.

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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.

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

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

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

Now the equation of circle

$(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$

$\Rightarrow (x + 1)(x - 2) + (y + 3)(y - 5) = 0$

$\Rightarrow x^2 - x - 2 + y^2 - 2y - 15 = 0$

$\Rightarrow x^2 + y^2 - x - 2y - 17 = 0$

We is the required equation.

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

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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 $x^2 + y^2 = b(x + y)$.

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15. $y = 2x$ be a chord of the circle $x^2 + y^2 = 10x$. 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 which passes through the points $(1, -2), (4, -3)$ and whose center lies on the line $3x + 4y = 7$.

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

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

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

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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.

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22. If the circles $x^2 + y^2 + 2gx + 2fy = 0$ and $x^2 + y^2 + 2g'x + 2f' = 0$ touch each other then prove that $f'f = fg$.

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

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24. Find the vertex, focus, equation of axis, equation of axis, equation of directrix, length of latus rectum and the co-ordinates of the ends of latus rectum for the following parabolas :

(i) $y^2 = 8x$

(ii) $y^2 = -12x$

(iii) $x^2 = 6y$

(iv) $x^2 = -2y$.

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

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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.

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

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

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

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

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34. Show that the parametric point $\left(2+t^2, 2t+1\right)$ 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 $y^2 = 2ax$.

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

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

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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) $\frac{x^2}{49} + \frac{y^2}{25} = 1$

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

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

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

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

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

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

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

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46. 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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47. Find the equation of the ellipse whose centre is at origin, the distance between foci is 2 and eccentricity is $\frac{1}{\sqrt{2}}$.

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48. Prove that the curves x=4 $(\cos\theta + \sin\theta)$ and y=3 $(\cos\theta - \sin\theta)$ represents an ellipse.

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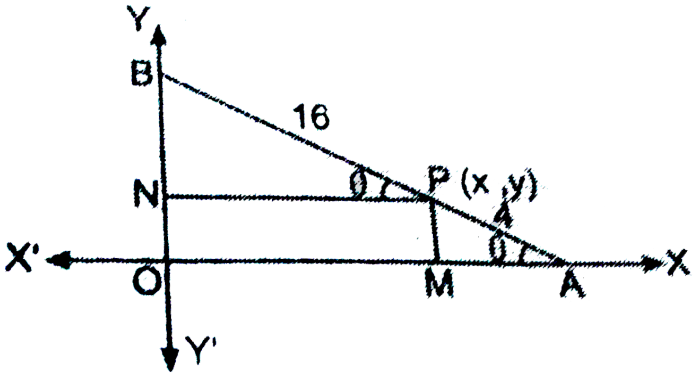
49. The ends of 20 cm long rod moves on two mutually perpendicular lines. If a point on this rod at 4 cm distance from end then from the

eccentricity of the ellipse formed by moving that point.



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

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

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

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

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

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55. Find the equation of the hyperbola where foci are $(0, \pm 12)$and the length of the latus rectum is 36.

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

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

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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.

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59. In a rectangular hyperbola $x^2 - y^2 = a$, 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.

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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.

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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-axis and end point B lies on y-axis. A

point P(x, y) is taken on the rod in such a way that AP = 6 cm. Show that the locus of P is an ellip

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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).

Find the equation of a circle in which the equations of its two diameters are 2x+y=5 and x-y=1 and its radius is 5 units.

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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).

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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.

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9. Find the centre and radius of each of the following circle : (i) $x^2 + y^2 + 4x - 4y + 1 = 0$

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

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

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

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

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

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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.

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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.

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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.

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

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

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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 $x^2 + y^2 - 4x - 8x - 6 = 0$ and whose radius is three times the radius of this circle.

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

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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)

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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.

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

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21. (i) Find the equation of a circle passes through the origin and cuts the intercepts of 6 units and 8 units on X-axis and Y-axis respectively.

(ii) Find the equation of a circle which passes through the two points on y-aixs whose distance from origin is 4 units and radius is 5 units.

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22. 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.

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

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24. Find the equation of a circle with centre (1,-3) and touches the line 2x-y-4=0.

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

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

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27. 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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28. 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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29. Find the equation of circle passing through the points (1,-2) and (3,-4) and touches the X-axis.

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

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32. (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 $x = a\theta + b\sin\theta$ and $y = a\sin\theta - b\cos\theta$ represents a circle.

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

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

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

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

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37. 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.

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38. The abscissa of two points A and B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and ordinates are the roots of equation

$x^2 + 2ax - b^2 = 0$. Find the equation of the circle whose diameter is AB.

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Exercise 11 B

1. Find the vertex, focus, directrix, latus rectum, equation of latus rectum, equation of axis and co-ordinates of ends of latus rectum for the following parabola :

(i) $y^2 = 20x$, (ii)$y^2 = -8y$

(iii) $x^2 = 16y$, (iv) $x^2 = -8y$

(v) $2x^2 = 3y$, (iv) $3y^2 + 4x = 0$

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2. Find the equation of parabolas whose :

(i) Focus is (0,0) and directrix is x+5=0

(ii) Focus is (1,2) and directrix is 2x-y-1=0.

(iii) Focus is (-2,3) and directrix is 2x-y+3=0.

(iv) Focus is (5,3) and directrix is 3x-4y+1=0.

(v) Focus is (0,4) and directrix is y+4=0.

(i) Focus is (-2,0) and directrix is x-2=0.

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3. Find the equation of that parabol whose :

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

(ii) vertex is (0,0) and focus is (0,3).

(iii) vertex is (4,0) and focus is (2,0).

(iv) vertex is (-2,0) and focus is (2,0).

(v) vertex is (1,1) and focus is (1,2).

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

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5. Find the vertex, co-ordinates of focus, axis , directrix and latus rectum of the following parabolas.

(i) $y^2 - 6x - 4y - 11 = 0$

(ii) $(x+2)^2 = 2(y+3)$

(iii) $y^2 = 4(x+1)$

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

(v) $x^2 = 2x + 2y$

(vi) $4y^2 - 6x - 8y - 5 = 0$

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

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

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

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9. Find the coordinates of points on the parabola $y^2 = 8x$ whose focal distance is 4.

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

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

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12. 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.

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

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

Also find equation its axis.

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

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16. Show that the equation

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

represents a parabola.

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17. 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)

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18. Prove that the equation of the parabola whose vertex and focus lie on x-axis at distances 'a' and 'b' from origin $(b > a)$, is

$y^2 = 4(b - a)(x - a)$.

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

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20. Find the equation of the parabola whose vertex is (3,-6) and the equation of directrix is

$5x - 3y + 1 = 0$

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21. Find the area of the triangle formed by the vertex and the ends of the latus rectum of the parabola

$x^2 = -36y.$

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22. 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 $a\left(t + \frac{1}{t}\right)^2$.

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23. Prove that the semi-latus rectum of a parabola is the harmonic mean of two parts of focal chord .

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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 co-ordinates of vertices, length of major and minor axis, eccentricity, co-ordinates of foci, length of latus rectum, co-ordinates of the ends of latus rectum and equation of directrices of each of following ellipse.

(i) $\frac{x^2}{16} + \frac{y^2}{9} = 1$, (ii) $\frac{x^2}{9} + \frac{y^2}{16} = 1$

(iii) $16x^2 + y^2 = 16$, (iv) $x^2 + 4y^2 = 4$

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

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

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

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

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

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

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

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

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

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12. If the eccentricity of an ellipse is zero, then show that it will be a circle.

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

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

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

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16. Find the eccentricity of the ellipse whose

(i) latus rectum is half of minor axis

(ii) minor axis is half of major axis.

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

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

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19. Find the equation of the ellipse whose minor aixs is equal to the distance between the foci and length of latus rectum is 10.

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20. 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.

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21. 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

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22. Show that the point (9,4) lies outside the ellipse

$$\frac{x^2}{10}+\frac{y^2}{9}=1$$

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23. If the sum of distances of a moving point from the points (ae, 0) and (-ae, 0) is 2a, then find the locus of the point. It is given than $b^2=a^2\left(1-e^2\right)$.

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24. 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.

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Exercise 11 D

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

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2. Find the vertices, transverse and conjugate axes, eccentricity, co-ordinates of foci, equation of directrices and length of latus rectum for each of the following hyperbola.

(i) $\frac{x^2}{16}+\frac{y^2}{9}=1$

(ii) $9x^2-4y^2=36$

(iii) $16y^2-9x^2=576$

(vi) $49x^2-16y^2=784$

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3. Find the equation of the hyperbola whose

(i) vertices are $(\pm 3, 0)$ and foci are $(\pm 5, 0)$

(ii) vertices are $(p0, m2)$ and foci are $(0, \pm 3)$

(iii) Foci are $(0, \pm 5)$ and length of transverse axis is 8.

(iv) Foci are $(\pm 13, 0)$ and length of conjugate axis is 10.

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

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

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

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

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

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8. 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 $\frac{x^2}{a^2} - \frac{y^2}{24} = 1$ then a is

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9. Find the equation of the hyperbola whose foci are `(0,pm4) and latus rectum is 12.

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

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

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

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13. Find the equation of the hyperbola in which the length of conjugate axis is 5 and the distance between foci is 13.

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14. (i) Find the equation of hyperbola whose eccentricity is $\sqrt{\frac{13}{12}}$ 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.

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

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Exercise 11 E

1. The focus of a parabolic reflector is at a distance of 5 cm from the vertex. IF the reflector is 45 cm deep, find the diameter of reflector.

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

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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.

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4. A man running a race course notes that the sum of the distances from the two flag posts from him is always 10 m and the distances between the flag posts is 8 m. Find the equation of track traced by man.

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5. 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

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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

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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

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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

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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

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

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

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

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

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

Answer: D

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

A. $(\pm 5, 0)$

B. $(\pm 4, 0)$

C. $(0, \pm 5)$

D. $(0, \pm 4)$

Answer: C

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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

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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 $\frac{x^2}{a^2} - \frac{y^2}{24} = 1$ then a is

A. $x^2 - 24y^2 = 1$

B. $24x^2 - y^2 = 24$

C. $x^2 - 24y^2 = 24$

D. $24x^2 - y^2 = 1.$

Answer: B

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10. The y-intercept cut from circle $x^2 + y^2 + 2x + 4y - 5 = 0$ is

A. 6 units

B. 8 units

C. 10 units

D. None of these

Answer: A

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Exercise 11 G

1. A line is drawn through a fix point P(α, β) to cut the circle $x^2 + y^2 = r^2$ at A and B. Then PA.PB is equal to :

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

B. (0,3)

C. (-1,1)

D. None of these

Answer: A

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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

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

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

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

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

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

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

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

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

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

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

A. $\sqrt{3}$

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

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

D. None of these.

Answer: D

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

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

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10. If e_1 and e_2 be the eccentricities of the hyperbola $xy = c^2$ and $x^2 - y^2 = c^2$ respectively then :

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 : $\left(\frac{1}{2}, \frac{1}{4}\right)$ and radius $\frac{1}{12}$

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

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

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

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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 is on the line $4x + y = 16$.

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11. Find the equation of the circle passing through the points $(2, \quad 3)$ and $(1, \quad 1)$ and whose centre is on the line $x \qquad 3y \qquad 11 \quad = \quad 0$.

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12. Find the equation of the circle with radius 5 whose centre lies on xaxis and passes through the point (2, 3).

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

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

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

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Exercise 11 2

1. $y^2 = 12x$

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2. $x^2 = 6y$

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3. $y^2 = -8x$

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4. $x^2 = -16y$

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5. Length of Latus Rectum of Parabola $y^2 = 10x$

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6. $x^2 = -9y$

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7. Focus (6,0), directrix x=-6

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8. Focus (0,-3), directrix y=3

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9. Vertex (0,0), focus (3,0)

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

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11. Vertex (0, 0) passing through (2,3) and axis is along x-axis.

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12. Vertex (0,0), passing through (5,2) and symmetric with respect to y-axis

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Exercise 11 3

1. $\frac{x^2}{36} + \frac{y^2}{16} = 1$

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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 $\frac{x^2}{4}+\frac{y^2}{25}=1$

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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 : $\frac{x^2}{16}+\frac{y^2}{9}=1$

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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 $\frac{x^2}{25}+\frac{y^2}{100}=1$

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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 $\frac{x^2}{49}+\frac{y^2}{36}=1$

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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 $\frac{x^2}{100}+\frac{y^2}{400}=1$

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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 $36x^2+4y^2=144$

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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 $16x^2 + y^2 = 16$

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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 of 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 $(\pm 4, 0)$

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

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

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16. Find the equation of the ellipse that satisfies the given conditions: Length of minor axis 16, foci (0 ± 6).

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17. Find the equation of the ellipse that satisfies the given conditions: Foci $(\pm 3, 0), a = 4$

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18. b=3, c=4, centre at origin , foci on the x axis.

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19. Centre at (0,0) major axis on the y-axis passes through the points (3,2) and (1,6).

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20. Major axis on the x-axis and passes through the points (4,3) and (6,2).

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Exercise 11 4

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

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2. Find the coordinates of the foci, the vertices, the 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 coordinates of the foci, the vertices, the 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 coordinates of the foci, the vertices, the eccentricity and the length of the latus rectum of the Hyperbola $49y^2 - 16x^2 = 784$

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7. Find the equation of Hyperbola satisfying the following conditions: Vertices $(\pm 2, 0)$, foci $(\pm 3, 0)$

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8. Find the equation of Hyperbola satisfying the following conditions: Vertices $(0, \pm 5)$, foci $(0, \pm 8)$

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9. Find the equation of Hyperbola satisfying the following conditions: Vertices $(0, \pm 3)$ foci $(0, \pm 5)$

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10. Find the equation of Hyperbola satisfying the following 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.

A. 4

B. 3

C. 2

D. 1

Answer: D

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12. Find the equation of Hyperbola satisfying the following conditions: Foci $(\pm 3\sqrt{5}, 0)$ the latus rectum is of length 8.

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13. Find the equation of Hyperbola satisfying the following conditions: Foci $(\pm 4, 0)$, the latus rectum is of length 12.

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14. Find the equation of Hyperbola satisfying the following conditions: Vertices $(\pm 7, 0)$, $e = \frac{4}{3}$.

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15. Find the equation of Hyperbola satisfying the following conditions: Foci $\left(0,\ \pm\sqrt{10}\right)$, 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 arch 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 wide 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

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4. An arch is in the form of a semiellipse. It is 8 m wide and 2 m high at the centre. Find the height of the arch at a point 1.5 m from one end.

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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.

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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.

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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.

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8. An equilateral triangle is inscribed in the parabola $y^2 = 4ax$ where are at the vertex of the parabola. find the length of the side of the triangle.

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