MATHS

NCERT - NCERT MATHEMATICS (ENGLISH)

CONIC SECTIONS

Exercise 11 2

1. Find the equation of the parabola that satisfies the given conditions:Vertex (0, 0);

focus $(2, 0)$

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2. Find the equation of the parabola that satisfies the given conditions:Vertex (0,0) passing through (2,3) arid axis is along x–axis.

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3. Find the equation of the parabola that satisfies the given conditions:Vertex (0, 0),

passing through (5, 2) and symmetric with respect to y–axis.

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4. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum.$y^2 = -8x$

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5. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum.$x^2 = 6y$

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

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7. Find the equation of the parabola that satisfies the given conditions:Focus $(6, 0)$; directrix $x = 6$

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8. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum.$x^2 = -9y$

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9. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum.$y^2 = 10x$

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10. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum.$x^2 = -16y$

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11. Find the equation of the parabola that satisfies the given conditions:Vertex (0, 0); focus (3,0)

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12. Find the equation of the parabola that satisfies the given conditions:Focus $(0, 3)$; directrix $y = 3$

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Exercise 11 4

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

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

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

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

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

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7. 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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8. 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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9. 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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10. Find the coordinate of the foci, coordinate of the vertices, eccentricity and the length of

the latus rectum of the hyperbola

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

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11. 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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12. 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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13. 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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14. 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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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.$16x^2 + y^2 = 16$

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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.$4x^2 + 9y^2 = 36$

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

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

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

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

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

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

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

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

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

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12. Find the equation of the ellipse in the following case: ends of major axis $(\pm 3, 0)$ ends of minor axis $(0, \pm 2)$

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

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

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15. Find the equation if the ellipse whose axes are along the coordinate axes, vertices are $(\pm 5, 0)$ and foci at $(\pm 4, -0)$.

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

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17. Find the equation for the ellipse that satisfies the given conditions:Length of minor axis 16, foci $(0, \pm 6)$.

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

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

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20. Find the equation of the ellipse with axes along the x-axis and the y-axis, which passes through the points P(4, 3) and Q(6, 2).

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Solved Examples

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

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2. 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

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3. Find the coordinates of the foci and the vertices, the eccentricity, the length of the latus rectum of the hyperbolas:(i) $\frac{x^2}{9} - \frac{y^2}{16} = 1$ (ii) $y^2 - 16x^2 = 1$

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4. Find the equation of the hyperbola with foci $(0, \pm 3)$ and vertices $\left(0, \pm \frac{\sqrt{11}}{2}\right)$

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5. Find the equation of the ellipse, whose length of the major axis is 20 and foci are $(0, \pm 5)$.

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6. Find the equation of the ellipse, with major axis along the x-axis and passing through the points $(4, 3)$and $(-1, 4)$.

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7. Find the coordinates of the foci, the vertices, the lengths of major and minor axes and the eccentricity of the ellipse $9x^2 + 4y^2 = 36$.

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

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9. A beam is supported at its ends by supports which are 12 metres apart. Since the load is connected at its centre, there is a deflection f 3 cm at the centre and the deflected beam is in the shape of a parabola. How far from the centre is the deflection 1 cm?

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10. A rod AB of length $15cm$ 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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11. Find an equation of the circle with centre at (0,0) and radius r.

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

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13.

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14. For the following parabola find the coordinates of the foci, the equation of the directrix and the lengths of the latus rectum:

$y^2 = 8x$

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15. Find the equation of the circle which passes through the points $(2, -2)$, and (3,4)

and whose centre lies on the line $x + y = 2$.

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16. Find the equation of the parabola with vertex at (0, 0) and focus at (0, 2).

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17. Find the equation of the parabola with focus (2, 0) and directrix $x = -2$.

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18. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the latus rectum of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$

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19. Find the equation of the parabola with vertex at origin, symmetric with respect to y-axis and 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 the 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 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.

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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.

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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 $y^2 = 4ax$ whose vertex is at the

vertex of the parabola .Find the length of its side.

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9. In each of the following find the equations of the hyperbola satisfying he given condition:

$foci\ (0,\ \pm 13)$ conjugate axis $= 24$

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Exercise 11 1

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

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2. 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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3. Find the equation of the circle with centre :

(0, 2) and radius 2

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4. Find the centre and radius of the circles

$(x+5)^2+(y-3)^2=36$

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5. Find the centre and radius of the circles

$x^2 + y^2 - 4x - 8y - 45 = 0$

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6. Find the equation of the circle with centre :

(1, 1) and radius $\sqrt{2}$

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

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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 circle $2x^2 + 2y^2 - x = 0$

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10. Does the point $(2, 5), (3, 5)$ lie inside, outside or on the circle $x^2 + y^2 = 25$?

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11. The equation of circle having centre at (2,2) and passes through the point (4,5) is

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

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

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

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