



MATHS

NCERT - NCERT MATHEMATICS

(GUJRATI)

CONIC SECTIONS

Example

1. Find the equation of the circle with centre at $(0, 0)$ and radius r .



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



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



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4. Find the equation of the circle which passes through the point $(2, -2)$, and $(3, 4)$ and whose centre lies on the line $x + y = 2$.



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5. Find the coordinates of the focus, axis, the question of the directrix and latus rectum of the parabola $y^2 = 8x$.



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



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



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8. Find the equation of the parabola which is symmetric about y -axis, and passes through

the point $(2, -3)$.



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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 latus rectum of the ellipse

$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$



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



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



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13. 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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14. 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) $y^2 - 16x^2 = 16$



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15. 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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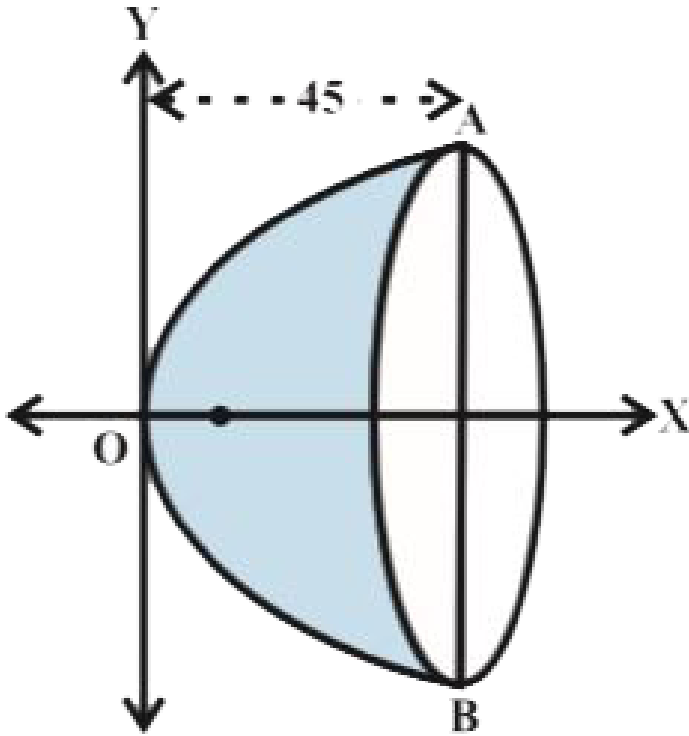
16. Find the equation of the hyperbola where foci are $(0, \pm 12)$ and the length of the latus rectum is 36.



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17. The focus of a parabolic mirror as shown in Fig 11.33 is at a distance of 5 cm from its vertex. If the mirror is 45 cm deep, find the

distance AB (*Fig11.33*).



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18. 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 deflection 1 cm ?



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19. 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 $AP = 6\text{cm}$. Show that the locus of P is an ellipse.



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Exercise 11 1

1. In each of the following find the equation of the circle with

centre $(0, 2)$ and radius 2



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2. In each of the following find the equation of the circle with

centre $(-2, 3)$ and radius 4



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3. In each of the following 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. In each of the following find the equation of the circle with

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



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5. In each of the following find the equation of the circle with

centre $(-a, -b)$ and radius $\sqrt{a^2 - b^2}$



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6. In each the following find the centre and radius of circles.

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



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7. In each the following find the centre and radius of circles.

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



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8. In each the following find the centre and radius of circles.

$$x^2 + y^2 - 8x + 10y - 12 = 0.$$



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9. In each the following find the centre and radius of 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 $(2, 3)$ and $(-1, -1)$ and whose centre is on the line $x-3y-11=0$.



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



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13. Find 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 $(-2.5, 3.5)$ lie inside , outside or on the circle $x^2 + y^2 = 25$?



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Exercise 11 2

1. In each of the following find the coordinates of the focus , axis of the parabola , the equation of the directrix and the length of the

latus rectum.

$$y^2 = 12x.$$



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2. In each of the following 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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3. In each of the following 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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4. In each of the following 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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5. In each of the following 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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6. In each of the following 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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7. In each of the find the equation of the parabola that satisfies the given conditions :

Focus $(6, 0)$, directrix $x = -6$



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8. In each of the find the equation of the parabola that satisfies the given conditions :

Focus $(0, -3)$, directrix $y = 3$



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9. In each of the find the equation of the parabola that satisfies the given conditions :

Vertex $(0, 0)$, focus $(3, 0)$



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10. In each of the find the equation of the parabola that satisfies the given conditions :

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



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11. In each of the find the equation of the parabola that satisfies the given conditions :

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



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12. In each of the 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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Exercise 11 3

1. In each of the 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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2. In each of the 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. In each of the 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. In each of the 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. In each of the 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. In each of the 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. In each of the 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. In each of the 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. In each of the 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. In each of the following find the equation for the ellipse that satisfies the given conditions :

Vertices $(\pm 5, 0)$, foci $(\pm 4, 0)$



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11. In each of the following find the equation for the ellipse that satisfies the given conditions :

Vertices $(0, \pm 13)$, foci $(0, \pm 5)$



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12. In each of the following find the equation for the ellipse that satisfies the given conditions :

Vertices $(\pm 6, 0)$, foci $(\pm 4, 0)$



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13. In each of the following find the equation for 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. In each of the following 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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15. In each of the following find the equation for the ellipse that satisfies the given conditions :

Length of major axis 26, foci $(\pm 5, 0)$



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16. In each of the following find the equation for the ellipse that satisfies the given conditions :

Length of minor axis 16, foci $(0, \pm 6)$



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17. In each of the following find the equation for the ellipse that satisfies the given conditions :

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



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18. In each of the following find the equation for the ellipse that satisfies the given conditions :

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



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19. In each of the following 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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20. In each of the following find the equation for the ellipse that satisfies the given conditions :

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



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Exercise 11 4

1. In each of the 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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2. In each of the find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas.

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



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3. In each of the find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas.

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



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4. In each of the find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the hyperbolas.

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





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5. In each of the 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. In each of the find the coordinates of the foci and the vertices, the eccentricity and the

length of the latus rectum of the hyperbolas.

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



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7. In each of the find the equations of the hyperbola satisfying the given conditions.

Vertices $(\pm 2, 0)$, foci $(\pm 3, 0)$



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8. In each of the find the equations of the hyperbola satisfying the given conditions.

Vertices $(0, \pm 5)$, foci $(0, \pm 8)$



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9. In each of the find the equations of the hyperbola satisfying the given conditions.

Vertices $(0, \pm 3)$, foci $(0, \pm 5)$



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10. In each of the 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. In each of the find the equations of the hyperbola satisfying the given conditions.

Foci $(0, \pm 13)$, the conjugate axis is of length 24.



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12. In each of the 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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13. In each of the 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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14. In each of the find the equations of the hyperbola satisfying the given conditions.

Vertices $(\pm 7, 0)$, $e = \frac{4}{3}$.



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15. In each of the 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 the 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 6m. Find the length of a

supporting wire attached to the roadway 18 m from the middle.



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4. An arch is in the form of a semi-ellipse. 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 3 cm 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 one vertex is at the

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



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