MATHS

BOOKS - MODERN PUBLISHERS MATHS (HINGLISH)

CONIC SECTIONS

Frequently Asked Questions

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

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2. Find the equation of a circle whose centre is $(2, -1)$ and which passes through the point $(3, 6)$.

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3. Find the equation of the circle whose centre is (h, k) and which touches :

(i). x- Axis (ii) y - axis (iii) both axes.

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4. Radii of circles $x^2 + y^2 = 1$, $x^2 + y^2 - 2x - 6y = 6$ and $x^2 + y^2 - 4x - 12y = 9$ are in

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5. Find the equation of the circle with: Centre $(a\cos\alpha,\ a\ s \in \alpha)$ and radius a.

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6. A circle of radius 4 units touches the cordinate axes in the first quadrant. If the circle makes one compete roll on the x-axis along the positive direction of x-axis, find its equation in new position .

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7. A circle of radius 4 units touches the cordinate axes in the first quadrant. Find the equation of its image in the line mirror y = 0 .

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8. Find the equation of the image of the circle $x^2 + y^2 + 8x - 16 + 64 = 0$ in the line mirror $x = 0$.

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9. Find the equation of the circle whose radius is $5 and$ which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at the point $(5, 5)$.

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10. Find the equation of a circle passing through the points (5,7), (6,6) and (2,-1). Also, find its centre and radius.

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11. Find the equation of the circle passing through the point $(2, 4)$ and having its centre at the intersection of the lines $x - y = 4$ and $2x + 3y + 7 = 0$.

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12. Find the equation of the circle whose centre lies on the line $x - 4y = 1$ and which passes through the points $(3, 7)$ and $(5, 5)$.

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13. Find the equation of the circle concentric With the circle $x^2 + y^2 - 4x - 6y - 9 = 0$ and passing through the point (-4, -5).

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14. Find the equation of a circle concentric with the circle

$2x^2 + 2y^2 - 6x + 8y + 1 = 0$

and of double its area.

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15. Show that the points $A(1, 0), B(2, -7), C(8, 1)$ and $D(9, -6)$ all lie on the same circle. Find the equation of this circle, its centre and radius.

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16. Find the equation of the parabola whose focus is at (-1,-2) and the directrix the line $x - 2y + 3 = 0$

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17. Find the equation of the parabola, which has vertex (0,0) and its symmetric about y-axis and passes through the point (2,-3).

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18. Find the equation of the parabola with vertex is at $(2, 1)$ and the directrix is $x = y - 1$.

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19. Show that the equation $y^2 - 8y - x + 19 = 0$ represents a parabola . Find its vertex, focus and directrix.

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20. Find the equation of the parabola whose latusreçtum is 4 units, axis is the line 3x + 4y - 4 = 0 and the tangent at the vertex is the line 4x - 3y +7 = 0.

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21. Find the lengths of the major and minor axes, coordinates of the vertices and the foci, the eccentricity and length of the latus rectum of the ellipse:

$4x^2 + 9y^2 = 144.$

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22. Find the equation of the ellipse satisfying the following conditions:

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

(ii) Foci at $(\pm 3, 0)$ passing through (4,1)

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

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24. Find the equation of the ellipse with eccentricity $\frac{3}{4}$, foci on the y-axis, centre at the origin and passing through the point (6, 4).

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25. Find the equation of the ellipse whose axes are parallel to the coordinate axes having its centre at the point $(2, -3)$ one focus at $(3, -3)$ and vertex at $(4, -3)$.

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26. Find the equation of the set of all points the sum of whose distance from the points $(3, 0) and (9, 0)$ is 12.

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27. Show that :

$4x^2 + 16y^2 - 24x - 32y = 12$ is the equation of ellipes , and find its

vertices, foci, eccentricity and directrices.

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Example

1. Show that the point (x, y) , where $x = 5\cos\theta, y = -3 + 5\sin\theta$, lies on a circle for all values of `theta

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2. Find the parametric equation of the circles : $x^2 + y^2 - 2x + 4y - 4 = 0$

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3. Find the equation of the following curve : x = a + c cos α, y = b + c sin, α, where 0 $\leq \alpha < 2\pi$, in cartesian form.

In case the curve is a circle, find its centre and radius.

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4. Show that the point (x,y) given y $x = \frac{2at}{1+t^2}$ and $y = \frac{a(1-t^2)}{1+t^2}$ lies on a circle..

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5. Find the equation of the circle drawn on the diagonal of the rectangle as its diameter whose sides are

x = 4 , x = - 2 and y = 5 and y = - 2.

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6. 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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7. Find the equation of the circle, which passes through the origin and makes intercepts 4 and 2 on the x and y axes respectively.

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8. Find the equation of the circle whose diameter is the portion of the line $3x + 4y - 14 = 0$, intercepted by the lines $y = x$ and $11x = 4y$.

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9. If the abscissae and the ordinates of two point $AandB$ be the roots of $ax^2 + bx + c = 0anda'y^2 + b'y = c' = 0$ respectively, show that the equation of the circle described on AB as diameter is $aa'\left(x^2 + y^2\right) + a'bx + ab'y + \left(ca' + ca\right) = 0.$

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

A. 80 cm

B. 40 cm

C. 50 cm

D. 60 cm

Answer: D

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11. over the towers of a bridge a cable is hung in the form of a parabola, have their tops 30 meters above the road way are 200 meters apart. If the cable is 5 meters above the road way at the centre of the bridge, then the length of the vertical supporting cable 30 meters from the centre is

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12. 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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13. 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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14. Find the length of the transverse axis, conjugate axis, eccentricity, vertices, foci and directrices of the hyperbola $9x^2 - 16y^2 = 144$.

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15. Find the equation of the parabola satisfying the following conditions :

Vertex $=(0, 0)$,Focus $=(0, 6)$

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16. Find the equation of the locus of all points such that difference of their distances from $(4, 0)$ and $(-4, 0)$ is always equal to 2.

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17. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Find the equation of the hyperbola, if its eccentricity is 2.

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18. If $e and e'$ the eccentricities of a hyperbola and its conjugate, prove that $\frac{1}{e^2} + \frac{1}{e'^2} = 1$.

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19. The equation $16x^2 - 3y^2 - 32x - 12y - 44 = 0$ represents a hyperbola, which one of the following is /are correct

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20. If the line $y = \sqrt{3} + k$ touches the circle $x^2 + y^2 = 16,$ then find the value of k.

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21. If the points $(0, 4) and (0, 2)$ are respectively the vertex and focus of a parabola, then find the equation of the parabola.

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22. If the latus rectum of an ellipse is equal to the half of minor axis, then find its eccentricity.

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23. Filnd the distance between the directrices the ellipse $\frac{x^2}{36} + \frac{y^2}{20} = 1.$

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24. If the line $y = \sqrt{3} + k$ touches the circle $x^2 + y^2 = 16,$ then find the value of k.

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25. If the points $(0, 4) and (0, 2)$ are respectively the vertex and focus of a parabola, then find the equation of the parabola.

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26. If the latus rectum of an ellipse is equal to the half of minor axis, then find its eccentricity.

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27. Filnd the distance between the directrices the ellipse $\frac{x^2}{36} + \frac{y^2}{20} = 1.$

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Exercise 11 A Short Answer Type Questions

1. Find the equations of the following circles :

(i) centre (0,2) and radius 2

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

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

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2. Find the centre and radius of each of that circles : $x^2 + (y-1)^2 = 2$

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Exercise 11 A Long Answer Type Questions I

1. Find the equation of circle passing through the points :

(0,0) ,(2,0) and (0,4)

also, find its centre and radius.

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2. Find the equation of the circle which is circumscribed about the triangle whose vertices are $A(-2, 3), B(5, 2)$ and $C(6, -1)$. Find the centre and radius of this circle.

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3. Find the equation of the circle with centre $(2, 2)$ and passing through the point $(4, 5)$.

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4. Equation of the circle with centre at (1,-2) , and passing through the centre of the circle $x^2 + y^2 + 2y - 3 = 0$, is

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

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6. Find the equation of the image of the circle $x^2 + y^2 + 8x - 16 + 64 = 0$ in the line mirror $x = 0$.

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7. Find the equation to the circle which touches the axis of x at a distance+3 from the origin and intercepts a distance 6 on the axis of y

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8. Find the equation of the circle of radius 5 whose centre lies on y-axis and passes through (3,2).

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9. Find the equation of the circle concentric with the circle $x^2 + y^2 + 4x + 4y + 11 = 0$ and passing through the point (5, 4).

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Exercise 11 A Long Answer Type Questions Ii

1. (i) A circle whoe centre is the point of intersection of the line 2x - 3y + 4 - 0 and 3x + 4y - 5 = 0 passes through the origin. Find its equation.

(ii) Find the equation of the circle passing through the point (1,-1) and centre at the intersection of the lines (x -y) = 4 and 2x + 3y = -7.

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

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3. 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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4. (i) Find the equation of a circle , which is concentric with the circle $x^2 + y^2 - 6x + 12y + 15 = 0$ and of double its radius.

(ii) Find the equation of a circle , which is concentric with the circle $x^2 + y^2 - 2x - 4y + 1 = 0$ and whose radius is 5.

(iii) Find the equation of the cricle concentric with $x^2 + y^2 - 4x - 6y - 3 = 0$ and which touches the y-axis.

(iv) find the equation of a circle passing through the centre of the circle $x^2 + y^2 + 8x + 10y - 7 = 0$ and concentric with the circle $2x^2 + 2y^2 - 8x - 12y - 9 = 0.$

(v) Find the equation of the circle concentric with the circle $x^2 + y^2 + 4x - 8y - 6 = 0$ and having radius double of its radius.

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5. Find the equation of the circle which is concentric with the circle $x^2 + y^2 - 4x + 6y - 3 = 0$ and the double of its area.

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6. The circle $(x-a)^2+(y-a)^2=a^2$ is rolled on the $y-a\xi s$ in the positive direction through one complete revolution. Find the equation of the circle in its new-position.

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7. Find the equation of a circle of radius 5 which lies within the circle $x^2+y^2+14x+10y-26=0$ and which touches the given circle at the point $(-1,3)$.

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8. Find the equation of the circle passing through the vertices of the triangle whose sides are :

x - y = 0 , 3x + 2y = 5 and x + 2y = 5 .

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9. Show that the points $(5, 5), (6, 4), (-2, 4)$ and $(7, 1)$, all lie on a circle. Find its equation, centre and radius.`

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10. Prove that the points (1,-6), (5,2) , (7,0) and (-1,-4) are concyclic. Find the radius of the circle .

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Exercise 11 B Short Answer Type Questions

1. Find the parametric representation of the circles :

(i) $3x^2 + 3y^2 = 4.$

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

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2. Find the parametric representation of circles :

(i) $x^2 + y^2 + 12x - 4y - 1 = 0$

(ii) $x^2 + y^2 + 2gx + 2fy + c = 0.$

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3. Find the parametric equation of the circles :

(i) $2x^2 + 2y^2 - 5x - 7y - 3 = 0$

(ii) $3x^2 + 3y^2 + 4x - 6y - 4 = 0.$

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4. Find the equations of the following curves in cartesian form. Wherever the curve is a circle. Find its centre and radius : (i) $x = 3\cos\alpha, y = 3\sin\alpha$, (ii) $x = at^2, y = 2at.$

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5. Find the Cartesian equation of the curves whose parametric equation are : $x = \frac{20t}{t + t^2}, y = \frac{5(4 - t^2)}{4 + t^2}$

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Exercise 11 C Short Answer Type Questions

1. Find the slope of the line passing through the points

(i) (2,3) and (-1,-3)

(ii) (-2,3) and (3, -5)

(iii) (-2,-3) and (-3, 5)

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2. Find the slope of the line passing through the points

(i) (3,2) and (2, 5)

(ii) (5, -3) and (2, -4)

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

(iv) (p, q) and (r,s) .

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3. Find the equation of the circle which passes through the origin and cuts off intercepts $3 and 4$ from the positive parts of the axes respectively.

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4. Find the equation of the circle , which passes through the origin and cuts off intercepts a and b from the axes.

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5. If one end of a diameter of the circle .

$x^2 + y^2 - 4x - 6y + 11 = 0$ is (8,4),

show that co -ordinates of the other end are (-4, 2) .

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6. One end of a diameter of a circle

$x^2 + y^2 - 3x + 5y - 4 = 0$

is (1, - 6) , find the other end .

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7. Find the equation of the circle drawn on the diagonals of the rectangle

as its diameter whose sides are :

(i) x = 6 , x = - 3, y = 3 and y = - 1

(ii) x = 5 , x = 8 , y = 4 , y = 7 .

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Exercise 11 D Short Answer Type Questions

1. Find the equation of the parabola with vertex at the origin and satisying the conditions :

(i) Focus (2,0) , Directrix x = - 2

(ii) Focu (0,-3) , Directirc y = 3 .

(b) Also, find the length of latus in each case.

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

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3. Find the equations of the following parabolas :

(i) Focus at (5, 0) , Directrix x = - 5

(ii) Vertex at (1,2) , Directrix x + y + 1 = 0.

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Exercise 11 D Long Answer Type Questions I

1. Find the equations of the following parabolas :

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

(ii) Vertex (0,0) , focus (0,2)

(iii) vertex (4,1) , focus (4, -3) .

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2. For the following parabolas find the coordinates of the foci, the equations of the directrices and the lengths of the latus rectum: $y^2 = 8x$

(ii) $x^2 = 86y$ (c) $y^2 = -12x$ (d) $x^2 = -16y$

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3. Find the equations of the parabolas with vertices origin and satisfying the following conditions :

(i) Focus at (6,0) (ii) Directrix x = - 6 .

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4. Find the equation of the parabola whose latusreçtum is 4 units, axis is the line 3x + 4y - 4 = 0 and the tangent at the vertex is the line 4x - 3y +7 = 0.

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5. Prove that the equation $y^2 + 2ax + 2by + c = 0$ represents a parabola whose axis is parallel to x-axis. Find its vertex and the equation of the double ordinate through the focus.

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6. Find the equation of the parabola which is symmetric about y-axis and passes through the point (2, - 3).

A. $x^2 = -\frac{4}{3}y$

B. $x^2 = \frac{4}{3}y$

C. $y^2 = -\frac{4}{3}x$

D. $y^2 = \frac{4}{3}x$

Answer: A

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Exercise 11 D Long Answer Type Questions Ii

1. Find the foci , vertices, directrices and axes of following parabola . Also draw its rough sketch $y = x^2 - 2x + 3$

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2. Find the vertex, focus, latus-rectum axis and directrix of the parabola $x^2 - y - 2x = 0.$

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3. Find the vertex, focus and directrix of the parabola

$x^2 + 4x + 2y - 7 = 0$.

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4. Find the focus, vertex, equation of the directrix and the axis of the parabola x $= y^2 - 2y + 3$.

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5. Find the equation of the parabola whose focus is$(1, 1)$ and tangent at the vertex is $x + y = 1$.

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6. If y_1, y_2, y_3 be the ordinates of a vertices of the triangle inscribed in a parabola $y^3 = 4ax$, then show that the area of the triangle is $\frac{1}{8a}|(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$.

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Exercise 11 E Long Answer Type Questions I

1. The focus of a parabolic mirror as shown in the figure alongside is at a distance of 6cm from its vertex. If the mirror is 20cm deep, find the distance L.M.

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2. 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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3. A water jet from a function reaches it maximum height of 4 m at a distance 0.5 m from the vertical passing through the point O of water outlet. The height of the jet above the horizontal OX at a distance of 0.75 m from the point O is 5 m (b) 6 m (c) 3 m (d) 7 m

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4. 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 F Long Answer Type Questions I

1. For the given ellipse ,find the equation of directrix (i) $\frac{x^2}{25}+\frac{y^2}{9}=1$

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

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

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

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2. find the equation the directrix of given ellipse $x^2+16y^2=16$

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3. For the following ellipse, find the equation of directrix

(i) $9x^2+4y^2=36$

(ii) $16x^2+25y^2=400$.

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4. Find the equation of ellipse that satifies the given conditions:

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

(b) Ends of major axis $(0, \pm \sqrt{5})$: ends of minor axis $(\pm 1, 0)$

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5. find the equation of an ellipse hose axes lie along coordinate axes and which passes through (4,3) and (-1,4).

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6. Find the equation of the ellipse referred to its axes as the axes of co-ordinates :

(i) whose major axis = 6 and minor axis = 4

(ii) Which passes through the point (-3, 1) and has eccentricity = $\sqrt{\frac{2}{5}}$

(iii) whose foci are (2,0) , (-2,0) and latus -rectum is 6.

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7. 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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Exercise 11 F Long Answer Type Questions Ii

1. Find the equation of the ellipse whose foci are $(2, 3), (-2, 3)$ and whose semi-minor axes is $\sqrt{5}$.

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2. Find the equation of the set of all points whose distances from $(0, 4) are \frac{2}{3}$ of their distances from the line $y = 9$.

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3. Show that $4x^2 + 16y^2 - 24x - 32y - 12 = 0$ is equation of an ellipse : and find its foci, vertices, eccentricity and directrices.

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4. Show that $4x^2 + 8x + y^2 - 4y + 4 = 0$ represents an ellipse. Find its eccentricity, co-ordinates of foci equations of major and minor axes and latus - rectum.

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5. Find the centre, the length of axes, the eccentricity and the foci of the ellipse $12x^2 + 4y^2 + 24x - 16y + 25 = 0$

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6. Find the eccentricity, centre, vertices, foci, minor axis, major axis, directrices and latus-rectum of the ellipse $25x^2 + 9y^2 - 150x - 90y + 225 = 0$.

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Exercise 11 G Long Answer Type Questions I

1. 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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2. 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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Exercise 11 H Short Answer Type Questions

1. Find the co-ordinates of the vertices, the foci, the eccentricity and the length of latus-rectum of the hyperbolas :

(a) $\frac{x^2}{9} - \frac{y^2}{16} = 1$

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

(ii) $y^2 - 16x^2 = 1$

(iii) $5y^2 - 9x^2 = 36$

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

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2. Find the lengths of transverse and conjugate axes, co-ordinates of foci, vertices and the eccentricity for the following hyperbolas :

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

(ii) $2x^2 - 3y^2 - 6 = 0$

(iii) $3x^2 - 2y^2 = 1$

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Exercise 11 H Long Answer Type Questions I

1. Find the equation of the hyperbola satisfying the given conditions :

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

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

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2. The equation of the hyperbola with centre at (0, 0) and co-ordinate axes as its axes, distance between the directrices being $\frac{4}{\sqrt{3}}$ and passing through the point (2, 1), is

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3. Find the equation of the hyperbola whose vertices are $(\pm 6, 0)$ and one of the directices is x = 4 .

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4. Find the equation of the hyperbola with vertices at $(0, \pm 6)$ and eccentricity $\frac{5}{3}$.

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5. For the hyperbola $4x^2 - 9y^2 = 1$, find the axes, centre, eccentricity, foci and equations of the directrices.

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6. Find the centre, eccentrcity, foci and directrices of the hyperboal :

$9x^2 - 16y^2 + 18x + 32y - 151 = 0.$

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Objective Type Questions Multiple Choice Questions

1. The equation of the circle in the first quadrant touching each co-ordinate axis at a distance of one unit from the origing is :

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

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

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

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

Answer: A

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2. Find the equation of the circle having $(1, -2)$ as its centre and passing through the intersection of the lines

$3x + y = 14 adn 2x + 5y = 18.$

A. $x^2 + y^2 - 2x + 4y - 20 = 0$

B. $x^2 + y^2 - 2x - 4y - 20 = 0$

C. $x^2 + y^2 + 2x - 4y - 20 = 0$

D. $x^2 + y^2 + 2x + 4y - 20 = 0$

Answer: A

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3. The area of the circle centred at (1,2) and passing through (4,6) is

A. 5π

B. 10π

C. 25π

D. none of these.

Answer: C

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4. Equation of a circle which passes through (3,6) and touches the axes is

A. $x^2 + y^2 + 6x + 6y + 3 = 0$

B. $x^2 + y^2 - 6x - 6y - 9 = 0$

C. $x^2 + y^2 - 6x - 6y + 9 = 0$

D. none of these.

Answer: C

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5. Equation of the circle with centre on the y-axis and passing through the origin and (2, 3) is

A. $x^2 + y^2 + 13y = 0$

B. $3x^2 + 3y^2 + 13x + 3 = 0$

C. $6x^2 + 6y^2 - 26y = 0$

D. $x^2 + y^2 + 13x + 3 = 0$

Answer: C

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6. The equation of a circle with origin as centre and passing through the vertices of an equilateral triangle whose median is of length 3 a is

A. $x^2 + y^2 = 9a^2$

B. $x^2 + y^2 = 16a^2$

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

D. $x^2 + y^2 = a^2$

Answer: C

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7. If the focus of a parabola is at (0, -3) and its directrix is y = 3, then its equation is

A. $x^2 = -12y$

B. $x^2 = 12y$

C. $y^2 = -12x$

D. $y^2 = 12x$

Answer: A

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8. If the parabola $y^2 = 4ax$ passes through the point (3,2) then find the length of its latus rectum.

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

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

C. $\frac{1}{3}$

D. 4

Answer: B

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9. If the vertex of a parabola is the point $(-3, 0)$ and the directrix is the line $x + 5 = 0$, then find its equation.

A. $y^2 = 8(x + 3)$

B. $x^2 = 8(y + 3)$

C. $y^2 = -8(x + 3)$

D. $y^2 = 8(x + 5)$

Answer: A

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

A. 12 sq. units

B. 16 sq. units.

C. 18 sq. units

D. 24 sq. units.

Answer: C

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11. Find the equation of the lines joining the vertex of the parabola $y^2 = 6x$ to the point on it which have abscissa 24.

A. $y \pm 2x = 0$

B. $2y \pm x = 0$

C. $x \pm 2y = 0$

D. $2x \pm y = 0$

Answer: B

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

A. $7x^2 + 2xy + 7y^2 - 10x + 10y + 7 = 0$

B. $7x^2 + 2xy + 7y^2 + 7 = 0$

C. $7x^2 + 2xy + 7y^2 + 10x - 10y - 7 = 0$

D. none of these.

Answer: A

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13. The lenth of the latus rectum of the ellipse $3x^2 + y^2 = 12$ is :

A. 4

B. 3

C. 8

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

Answer: D

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14. If e is the eccentricity of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

(a $<$ b) , then ,

A. $b^2 = a^2(1 - e^2)$

B. $a^2 = b^2(1 - e^2)$

C. $a^2 = b^2(e^2 - 1)$

D. $b^2 = a^2(e^2 - 1)$

Answer: B

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15. The equation of the ellipse whose centre is at origin and which passes through the points (-3,1) and (2,-2) is

A. $5x^2 + 3y^2 = 32$

B. $3x^2 + 5y^2 = 32$

C. $5x^2 - 3y^2 = 32$

D. $3x^2 + 5y^2 + 32 = 0$

Answer: B

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16. The eccentricity of the hyperbola whose latuscrectum is 8 and conjugate axis is equal to half the distance between the foci, is

A. $\frac{4}{3}$

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

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

D. none of these.

Answer: C

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17. If the distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then obtain its equation.

A. $x^2 - y^2 = 32$

B. $\frac{x^2}{4} - \frac{y^2}{9} = 1$

C. $2x^2 - 3y^2 = 7$

D. none of these.

Answer: A

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18. The length of the transverse axis of a hyperbola is 7 and it passes through the point $(5, -2)$. The equation of the hyperbola is

A. $\frac{4}{49}x^2 - \frac{196}{51}y^2 = 1$

B. $\frac{49}{4}x^2 - \frac{51}{196}y^2 = 1$

C. $\frac{4}{49}x^2 - \frac{51}{196}y^2 = 1$

D. none of these.

Answer: C

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19. Equation of the hyperbola with eccentricity $\frac{3}{2}$ and foci at $(\pm 2, 0)$ is

A. $\frac{x^2}{4} - \frac{y^2}{3} = \frac{4}{9}$

B. $\frac{x^2}{9} - \frac{y^2}{5} = \frac{4}{9}$

C. $\frac{x^2}{4} - \frac{y^2}{9} = 1$

D. none of these.

Answer: A

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20. The equation of the chord joining the points (x_1, y_1) and (x_2, y_2) on the rectangular hyperbola xy = c^2 is :

A. $\frac{x}{x_1 + x_2} + \frac{y}{y_1 + y_2} = 1$

B. $\frac{x}{x_1 - x_2} + \frac{y}{y_1 - y_2} = 1$

C. $\frac{x}{y_1 + y_2} + \frac{y}{x_1 + x_2} = 1$

D. $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$

Answer: A

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21. The foci of the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ is :

A. (0,5)

B. (5,0)

C. $(\pm 5, 0)$

D. $(0, \pm 5)$

Answer: C

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22. Centre of the circle $2x^2 + 2y^2 - x = 0$ is :

A. $\left(\frac{1}{2}, 0\right)$

B. $\left(-\frac{1}{2}, 0\right)$

C. $\left(\frac{1}{4}, 0\right)$

D. $\left(-\frac{1}{4}, 0\right)$

Answer: C

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23. For the circle $x^2 + y^2 = 25,$ the point (-2.5, 3.5) lies :

A. Inside circle

B. Outside circle

C. On the circle

D. none of these.

Answer: A

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24. (i) Centre of the circle $x^2 + y^2 - 8x + 10y + 12 = 0$ is

Centre of the circle $2x^2 + 2y^2 - x = 0$ is :

A. $\left(\frac{1}{2}, 0\right)$

B. $\left(-\frac{1}{2}, 0\right)$

C. $\left(\frac{1}{4}, 0\right)$

D. $\left(-\frac{1}{4}, 0\right)$

Answer: C

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25. Length of the semi-latus -rectum of parabola :

$x^2 = -16y$ is :

A. 4

B. 8

C. -4

D. -8

Answer: B

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26. The focus of the parabola $y^2 = -4ax$ is :

A. (2, a)

B. (-a, 0)

C. (0,2)

D. (0, -2)

Answer: B

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27. The length of latus-rectum of parabola $x^2 = -16y$ is :

A. 4

B. 16

C. -4

D. -3

Answer: B

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28. The eccentricity of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is always ,

A. 1

B. less than 1

C. greater than 1

D. none of these.

Answer: B

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29. If the slope of the line containg the point (2,5) and (x, - 4) is 3, then the value of x is :

A. 3

B. 1

C. 2

D. -1

Answer: D

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30. If the slope of a line is not defined then the line :

A. is parallel to x-axis

B. is parallel to y-axis

C. passcs through the origin

D. cut x and y-axes .

Answer: B

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31. Eccentricity of the hyperbola $x^2 - y^2 = a^2$ is :

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

B. 1

C. $\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: C

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32. The foci of the ellipse $\frac{x^2}{4} + \frac{y^2}{25} = 1$ are :

A. $(\pm\sqrt{5}, 0)$

B. $(-5, 0)$

C. $(0, -5)$

D. none of these.

Answer: D

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33. The co-ordinates of the foci of the ellipse $9x^2 + 4y^2 = 36$ are :

A. $(0, \pm\sqrt{5})$

B. $(\pm 5, 0)$

C. (0,0)

D. none of these.

Answer: A

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34. If e and e' be the eccentricities of two conics $S=0$ and $S'=0$ and if $e^2+e'^2=3$, then both S and S' can be

A. ellipses

B. parabolas

C. hyperbolas

D. none of these.

Answer: C

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35. The equatio $\frac{x^2}{2-r}+\frac{y^2}{r-5}+1=0$ represents an ellipse, if

A. $r>2$

B. $r>5$

C. $2<r<5$

D. none of these.

Answer:

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Objective Type Questions Fill In The Blanks

1. The co-ordinates of the centre of the circle $2x^2 + 2y^2 - 6x + 8y - 4 = 0$ are ..... .

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

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3. The value of 'p' so that $x^2 + y^2 + 8x + 10y + p = 0$ is the equation of a circle of radius 7 units is ..... .

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

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5. The focus of the parabola $2y^2 = 5x$ is ..... .

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

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7. Find the equation of the ellipse with foci at $(\pm 5, 0) and x = \frac{36}{5}$ as one of the directrices.

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8. A hyperabola in which a = b is called ..... . Hyperabola .

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9. Length of latus -rectum of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is ..... .

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10. 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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Objective Type Questions True False Questions

1. The directrix of the parabola $x^2 = 6y$ is y = $-\frac{3}{2}$.

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2. The directrix of the parabola $y^2 = 12x$, is $x - 3$.

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3. The directrix of the parabola $y^2 = -8x$ is, $x = 2$.

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4. The eccentricity of the ellipse $\frac{x^2}{49} + \frac{y^2}{36} = 1$ is $\frac{\sqrt{5}}{3}$.

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5. The latus -rectum of the hyperbola $16x^2 - 9y^2 = 576$ is $\frac{64}{5}$

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Objective Type Questions Very Short Answer Type Questions

1. Parabola

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2. Ellipse

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3. Hyperbola

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4. Define eccentricity of an ellipse

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5. Determine whether the following represents a circle , a point or no circle :

(i) $1 - x^2 - y^2 = 0$ (ii) $x^2 + y^2 + 2x + 1 = 0$ (iii) $x^2 + y^2 - 3x + 3y + 10 = 0$.

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6. Find the equation of circle whose centre is $\left(\frac{1}{2}, \frac{1}{2}\right)$ and radius is $\frac{1}{\sqrt{2}}$.

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7. Find the parametric equation of the circles : $x^2 + y^2 + 2x - 4y - 1 = 0$

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8. Show that the point (x, y), where $x = a + r\cos\theta$, $y = b + r\sin\theta$, lies on a circle for all values of θ.

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9. Find the equation of the circle when the end points of a diameter of the circle are : $(3, 4)$ and $(-3, -4)$

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10. The equation of the parabola with vertex at the origin passing through $(2, 3)$ and the axis along x-axis is

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11. Find the equation of the parabola with focus at (3, -4) and directrix x + y - 2 = 0 .

A. $x^2 + 4xy + y^2 - 8x + 20y + 46 = 0$

B. $x^2 + 2xy + y^2 - 8x + 20y + 46 = 0$

C. $x^2 - 2xy + y^2 - 8x + 20y + 46 = 0$

D. $x^2 - 4xy + y^2 - 8x + 20y + 46 = 0$

Answer: C

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12. Find the lengths of major and minor axes of the ellipse :

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

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13. Find the lengths of the major and the minor axes, the coordinates of the foci, the vertices, the eccentricity, the length of latus rectum and the eqatuion of the directrices of that ellipses : $x^2 + 16y^2 = 16$.

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14. Find the length of the latus -rectum of the ellipse :

$\frac{x^2}{4} + \frac{y^2}{9} = 1$.

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15. The equation of the ellipse whose centre is at origin and which passes through the points (-3,1) and (2,-2) is

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16. Find the equation of the ellipse in the following case: eccentricity $e = \frac{2}{3}$ and length of latus rectum $= 5$.

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17. Find the eccentricity of an ellipse if its latus rectum is equal to one-half of its major axis.

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18. The eccentricity of the ellipse if the distance between the foci is equal to the length of the latusrectum ,is

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19. Find the equation of the ellipse whose major axis is 8 and eccentricity $\frac{1}{2}$.

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20. Find the equation of the hyperbola having : vertices $(0, \pm 3)$ and $foci(0, \pm 5)$.

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21. Find the equation of the hyperbola with focus at $(\pm 2, 0)$ and $e = \frac{3}{2}$.

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22. Find the equation of the hyperbola with vertices at $(0, \pm 6)$ and eccentricity $\frac{5}{3}$.

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23. 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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24. Find the of the hyperbola passing through the points (2, 1) and (4,3)

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Ncert File 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 $x \quad 3y \quad 11 \quad = \quad 0$.

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

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Ncert File Exercise 11 2

1. For each of that parabolas, find the coordinates of the focus, the equation of the directrix and the length of latus rectum : $y^2 = 12x$

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2. 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. Find the co-ordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum

$y^2 = -18x$.

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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.$x^2 = -16y$

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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.$y^2 = 10x$

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

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

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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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Ncert File Exercise 11 3

1. Find the latus rectum of ellipse

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

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2. Find 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 foci and eccentricity of ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1.$

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4. Find the coordinats of the foci, the vertice ,eccentricity and length of latus rectum of ellipse $\frac{x^2}{25} + \frac{y^2}{100} = 1.$

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5. Find 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 coordinats of the foci, the vertice ,eccentricity and length of latus rectum of ellipse $\frac{x^2}{100} + \frac{y^2}{100} = 1.$

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7. Find the ecentricity of ellipse $36x^2 + 4y^2 = 144.$

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8. Find the ecentricity and length of latus rectum of the ellipse $16x^2 + y^2 = 16.$

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9. Find the ecentricity and foci of the ellipse $4x^2 + 9y^2 = 144$

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

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

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

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13. 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. Ends of major axis $(0, \pm \sqrt{5})$, ends of minor axis $(\pm 1, 0)$

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

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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.

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

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Ncert File 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. $\frac{x^2}{16} - \frac{y^2}{9} = 1$

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2. 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. 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. 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. 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 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. Find the equations of the hyperbola satisfying the given conditions :Vertices $(\pm 2, 0)$, $foci(\pm 3, 0)$

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8. Find the equations of the hyperbola satisfying the given conditions :Vertices $(0, \pm 5)$, $foci(0, \pm 8)$

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9. Find the equations of the hyperbola satisfying the given conditions :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.

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12. 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. 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. 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 following find the equations of the hyperbola satisfying he given condition: foci $\left(0, \pm\sqrt{10}\right)$ passing through (2,3)

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Miscellaneous Exercise On Chapter 11

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 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. For what value of the slope m is the line, with equation $y = mx - 3$, tangent to the parabola with equation $y = 3x^2 - x$

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Exercise

1. If a circle passes through the points (0,0),(a,0)and(0,b), then find the coordinates of its centre.

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2. Find the equation of the circle having $(1, -2)$ as its centre and passing through the intersection of the lines $3x + y = 14 adn 2x + 5y = 18.$

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3. Find the equation of each of the following parabolas (i) directrix $x = 0$, focus at $(6, 0)$

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4. If the ellipse with equation $9x^2 + 25y^2 = 225$, then find the eccentricity and foci.

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5. Find the equation of the hyperbola with :

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

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Revision Exercise

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

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2. Prove that the centres of the three circles $x^2 + y^2 - 4x - 6y - 12 = 0, x^2 + y^2 + 2x + 4y - 5 = 0$ and $x^2 + y^2 - 10x -$ are collinear.

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3. Prove that, through three given points which are not collinear, there is only one circle.

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4. Find the equations of the circles touching y-axis at (0,3) and making an intercept of 8 units on the x-axis.

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5. Find the area of the equilateral triangle that can be inscribed in the circle :

$x^2 + y^2 - 4x + 6y - 3 = 0$

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6. Find the equation of the circle circumscribing the quadrilateral formed by the straight lines

$x - y = 0, 3x + 2y = 5, x - y = 10$ and $2x + 3y = 0$

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7. Lines $5x + 12y - 10 = 0$ and $5x - 12y - 40 = 0$touch a circle C_1 of diameter 6.If the centre of C_1 lies in the first quadrant, find the equation of the circle C_2 which is concentric with C_1 and cuts, intercepts of length 8 on these lines.

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8. If the distances from the origin of the centers of three circles $x^2 + y^2 + 2\lambda x - c^2 = 0, (i = 1, 2, 3),$ are in GP, then prove that the lengths of the tangents drawn to them from any point on the circle $x^2 + y^2 = c^2$ are in GP.

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9. Determine equation of the circle whose diameter is the chord $x + y = 1$ of the circle $x^2 + y^2 = 4$

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10. A rectangle $ABCD$ is inscribed in a circle with a diameter lying along the line $3y = x + 10$. If A and B are the points $(-6, 7) and (4, 7)$ respectively, find the area of the rectangle and equation of the circle.

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11. Find the equation to the circle which passes through the origin and cut off equal chords of length $'a'$ from the straight lines $y = xandy = -x$.

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12. Prove that the equation $y^2 + 2Ax + 2By + c = 0$ is represent a parabola and whose axis is parabola to x axis.

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13. A double ordinate of the parabola $y^2 = 4ax$ is of length 8a. Prove that the lines from the vertex to its two ends are at right angles.

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14. The equation of the parabola whose vertex and focus lie on the axis of x at distances a and a_1 from the origin, respectively, is $y^2 - 4(a_1 - a)x$

$y^2 - 4(a_1 - a)(x - a)$ $y^2 - 4(a_1 - a)(x - a)1)$ $noneofthese$

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15. The equation of the common tangent to the parabolas $y^2 = 4ax$and $x^2 = 4by$ is given by

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16. Find the locus of the middle points of all chords of the parabola $y^2 = 4ax$, which are drawn through the vertex.

A. $y^2 = -4ax$

B. $y^2 = 2ax$

C. $y^2 = 4ax$

D. $y^2 = -2ax$

Answer: B

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17. If any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ cuts off intercepts of length h and k on the axes, then $\frac{a^2}{h^2}+\frac{b^2}{k^2}=$ (A) 0 (B) 1 (C) -1 (D) Non of these

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18. The vertices of a quadrilateral are situated at foci and the extrimities of the minor axis of the ellipse $4x^2+9y^2=36$. Find the area of the quadrilateral .

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

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20. Find the locus of the-mid points of the chords of the circle $x^2 + y^2 = 16$, which are tangent to the hyperbola $9x^2 - 16y^2 = 144$

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Check Your Understanding

1. Find the equation of a circle with centre (h, k) and touching the x -axis.

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2. Find the centre and radius of each of that circles : $\left(x - \frac{1}{2}\right)^2 + \left(y + \frac{1}{3}\right)^2 = \frac{1}{4}$

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3. What are the parametric equations of the circle :

$(x-h)^2+(y-k)^2=r^2.$

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4. Find the equation of the parabola whose focus is (2, 0) and directrix is

$x=-2.$

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

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6. When does the ellipse become a circle ?

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

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8. Find the eccentricity of an ellipse whose latus rectum in one half of its major axis.

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9. If $eande'$ the eccentricities of a hyperbola and its conjugate, prove that $\frac{1}{e^2} + \frac{1}{e'^2} = 1.$

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10. 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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Competition File

1. The point diametrically opposite to the point P(1, 0) on the circle $x^2 + y^2 + 2x + 4y - 3 = 0$ is

A. (3,4)

B. (3,-4)

C. (-3,4)

D. (-3,-4)

Answer: D

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2. A parabola has the origin as its focus and the line $x = 2$ as the directrix. Then the vertex of the parabola is at

A. (2,0)

B. (0,2)

C. (1,0)

D. (0,1)

Answer: C

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3. A focus of an ellipse is at the origin. The directrix is the line $x = 4$ and the eccentricity is $\frac{1}{2}$ Then the length of the semi-major axis is

A. $\frac{5}{2}$

B. $\frac{8}{3}$

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

D. $\frac{4}{3}$

Answer: B

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4. If P and Q are the points of intersection of the circles $x^2 + y^2 + 3x + 7y + 2p5 = 0$ and $x^2 + y^2 + 2x + 2yp^2 = 0$, then there is a circle passing through P, Q and $(1, 1)$ for (1) all values of p (2) all except one value of p (3) all except two values of p (4) exactly one value of p

A. All values of p

B. all except one value of p

C. all except two values of p

D. exactly one values of p.

Answer: B

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5. The ellipse $x^2 + 4y^2 = 4$ is inscribed in a rectangle aligned with the coordinate axes, which in turn is inscribed in another ellipse that passes through the point (4, 0). Then the equation of the ellipse is (1) $x^2 + 16y^2 = 16$ (2) $x^2 + 12y^2 = 16$ (3) $4x^2 + 48y^2 = 48$ (4) $4x^2 + 64y^2 = 48$

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

B. $x^2 + 12y^2 = 16$

C. $4x^2 + 48y^2 = 48$

D. $4x^2 + 64y^2 = 48.$

Answer: B

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6. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points, if (a)-85 lt m lt-35 (c) 15 lt m lt 65 (b)-35 lt m lt 15 (d) 35

lt m lt 85

A. $-85 < m < -35$

B. $-35 < m < 15$

C. $15 < m < 65$

D. $35 < m < 85$

Answer: B

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7. If two tangents drawn from a point P to the parabola y2 = 4x are at right angles, then the locus of P is (1) $2x + 1 = 0$ (2) $x = 1$ (3) $2x1 = 0$ (4) $x = 1$

A. x = 1

B. 2x + 1 = 0

C. x = - 1

D. 2x -1 = 0

Answer: C

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8. If the two circles $x^2 + y^2 + ax = 0$ and $x^2 + y^2 = c^2$, where $a, c > 0$, touch each other intenally , then :

A. 2 |a| = c

B. |a| = c

C. a = 2c

D. |a | = 2c

Answer: B

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9. The equation of the circle passing through the point $(1, 0)$ and $(0, 1)$ and having the smallest radius is

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

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

C. $x^2 + y^2 + 2x + 2y - 7 = 0$

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

Answer: B

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10. Find the equation of an ellipse hose axes lie along the coordinate axes, which passes through the point (-3,1) and has eccentricity equal to $\sqrt{2/5}$.

A. $3x^2 + 5y^2 - 32 = 0$

B. $5x^2 + 3y^2 - 48 = 0$

C. $3x^2 + 5y^2 - 15 = 0$

D. $5x^2 + 3y^2 - 32 = 0.$

Answer: A

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11. The equation of the hyperbola whose foci are (-2, 0) and (2,0) and eccentricity is 2 is given by

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

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

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

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

Answer: B

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12. The length of the diameter of the circle which touches the x-axis at the point (1, 0) and passes through the point (2, 3)

A. $\frac{10}{3}$

B. $\frac{3}{5}$

C. $\frac{6}{5}$

D. $\frac{5}{3}$

Answer: A

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13. An ellipse is drawn by taking a diameter of the circle $(x-1)^2 + y^2 = 1$, as its semi-minor axis and a diameter of the circle $x^2 + (y-2)^2 = 4$ as its semi-major axis. If the centre of the ellipse is at the origin and its axes are the coordinate axes, then the equation of the ellipse is:

A. $4x^2 + y^2 = 4$

B. $x^2 + 4y^2 = 8$

C. $4x^2 + y^2 = 8$

D. $x^2 + 4y^2 = 16.$

Answer: D

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14. The circle passing through (1, -2) and touching the axis of x at (3, 0) also passes through the point (1) (2, -5) (2) (5, -2) (3) (-2, 5) (4) (-5, 2)

A. (2,-5)

B. (5,-2)

C. (-2,5)

D. (-5,-2)

Answer: B

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15. the equation of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having centre at (0,3) is

A. $x^2+y^2-6y+7=0$

B. $x^2+y^2-6y-5=0$

C. $x^2+y^2-6y+5=0$

D. $x^2+y^2-6y-7=0$

Answer: D

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16. Let C be the circle with centre at (1, 1) and radius = 1. If T is the circle centred at (0, y), passing through origin and touching the circle C externally, then the radius of T is equal to (1) $\frac{\sqrt{3}}{\sqrt{2}}$ (2) $\frac{\sqrt{3}}{2}$ (3) $\frac{1}{2}$ (3) $\frac{1}{4}$

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

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

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

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

Answer: C

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17. The slope of the line touching both the parabolas $y^2 = 4x$ and $x^2 = -32y$ is (a) $\frac{1}{2}$ (b) $\frac{3}{2}$ (c) $\frac{1}{8}$ (d) $\frac{2}{3}$

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

B. $\frac{1}{8}$

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

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

Answer: D

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18. The locus of the foot of perpendicular drawn from the centre of the ellipse $x^2 + 3y^2 = 6$ on any tangent to it is (1) $\left(x^2 - y^2\right)^2 = 6x^2 + 2y^2$ (2) $\left(x^2 - y^2\right)^2 = 6x^2 - 2y^2$ (3) $\left(x^2 + y^2\right)^2 = 6x^2 + 2y^2$ (4) $\left(x^2 + y^2\right)^2 = 6x^2 - 2y^2$

A. $\left(x^2 - y^2\right)^2 = 6x^2 - 2y^2$

B. $\left(x^{20} + y^2\right)^2 = 6x^2 + 2y^2$

C. $\left(x^2 + y^2\right)^2 = 6x^2 - 2y^2$

D. $\left(x^2 - y^2\right)^2 = 6x^2 + 2y^2$

Answer: B

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19. Locus of the image of the point (2, 3) in the line $(2x - 3y + 4) + k(x - 2y + 3) = 0, k\varepsilon R$, is a : (1) straight line parallel

to x-axis. (2) straight line parallel to y-axis (3) circle of radius $\sqrt{2}$ (4) circle of radius $\sqrt{3}$

A. Straight line parallel to x-axis

B. Straight line parallel to y-axis

C. circle of radius $\sqrt{2}$

D. circle of radius $\sqrt{3}$

Answer: C

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20. The number of common tangents to the circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$, is

A. 1

B. 2

C. 3

D. 4

Answer: C

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21. Let O be the vertex and Q be any point on the parabola, $x^2 = 8y$. It the point P divides the line segment OQ internally in the ratio 1 : 3, then the locus of P is : (1) $x^2 = y$ (2) $y^2 = x$ (3) $y^2 = 2x$ (4) $x^2 = 2y$

A. $x^2 = y$

B. $y^2 = x$

C. $y^2 = 2x$

D. x^(2) = 2y`.

Answer: D

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22. The area (in sq. units) of the quadrilateral formed by the tangents at the end points of the latera recta to the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$, is: (1) $\frac{27}{4}$ (2) 18 (3) $\frac{27}{2}$ (4) 27

A. $\frac{27}{4}$

B. 18

C. $\frac{27}{2}$

D. 27

Answer: D

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23. If one of the diameters of the circle, given by the equation, $x^2+y^2-4x+6y-12=0$, is a chord of a circle S, whose centre is at $(-3,2)$, then the radius of S is : (1) $5\sqrt{2}$ (2) $5\sqrt{3}$ (3) 5 (4) 10

A. $5\sqrt{5}$

B. $5\sqrt{3}$

C. 5

D. 10

Answer: B

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24. Let P be the point on the parabola, $y^2 = 8x$ which is at a minimum distance from the centre C of the circle,$x^2 + (y + 6)^2 = 1$. Then the equation of the circle, passing through C and having its centre at P is : (1) $x^2 + y^2 - 4x + 8y + 12 = 0$ (2) $x^2 + y^2 - x + 4y - 12 = 0$ (3) $x^2 + y^2 - \frac{x}{4} + 2y - 24 = 0$ (4) $x^2 + y^2 - 4x + 9y + 18 = 0$

A. $x^2 + y^2 - x + 4y - 12 = 0$

B. $x^2 + y^2 - \frac{x}{4} + 2y - 24 = 0$

C. $x^2 + y^2 - 4x + 9y + 18 = 0$

D. $x^2 + y^2 - 4x + 8y + 12 = 0$

Answer: D

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25. The centres of those circles which touch the circle, $x^2 + y^2 - 8x - 8y - 4 = 0$, externally and also touch the x-axis, lie on : (1) a circle. (2) an ellipse which is not a circle. (3) a hyperbola. (4) a parabola.

A. an ellipse, which is not a circle

B. a hyperbola

C. a parabola

D. a circle

Answer: C

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26. The eccentricity of the hyperbola whose length of the latus rectum is equal to 8 and the length of its conjugate axis is equal to half of the

distance between its foci , is

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

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

C. $\sqrt{3}$

D. $\frac{4}{3}$

Answer: B

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27. A hyperbola passes through the point $P(\sqrt{2}, \sqrt{3})$ and has foci at $(\pm 2, 0)$. Then the tangent to this hyperbola at P also passes through the point : $(\sqrt{3}, \sqrt{2})$ (2) $(-\sqrt{2}, -\sqrt{3})$ (3) $(3\sqrt{2}, 2\sqrt{3})$ (4) $(2\sqrt{2}, 3\sqrt{3}$

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

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

C. $(-\sqrt{2}, -\sqrt{3})$

D. $\left(3\sqrt{2}, 2\sqrt{3}\right)$.

Answer: A

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28. Let the orthocentre and centroid of a triangle be $(-3, 5)$ and $B(3, 3)$ respectively. If C is the circumcentre of the triangle then the radrus of the circle having line segment AC as diameter, is

A. $\sqrt{10}$

B. $2\sqrt{10}$

C. $3\sqrt{\frac{5}{2}}$

D. $3\sqrt{\frac{5}{2}}$

Answer: C

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29. IF the tangent at $(1, 7)$ to the curve $x^2 = y - 6$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0,$ then the value of c is

A. 195

B. 185

C. 85

D. 95

Answer: D

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30. Tangents are drawn to the hyperbola $4x^2 - y^2 = 36$ at the points P and Q. If these tangents intersect at the point T(0,3) then the area (in sq units) of $\triangle PTQ$ is

A. $45\sqrt{5}$

B. $54\sqrt{3}$

C. $60\sqrt{3}$

D. $36\sqrt{5}$

Answer: A

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31. If a variable line $3x + 4y - \lambda = 0$ is such that the two circles $x^2 + y^2 - 2x - 2y + 1 = 0$ and $x^2 + y^2 - 18x - 2y + 78 = 0$ are on its opposite sides, then the set of all values of λ is the interval

A. (2,17)

B. (12, 21)

C. (13, 23)

D. (23, 31)

Answer: B

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32. Let $P(4, -4)$ and $Q(9, 6)$ be two points on the parabola, $y^2 = 4x$ and let X be any point on the are POQ of this parabola, where O is the vertex of this parabola, such that the area of ΔPXQ is maximum. Then this maximum area (in square units) is $\frac{25k}{4}$. The value of k is

A. $\frac{75}{2}$

B. $\frac{125}{4}$

C. $\frac{625}{4}$

D. $\frac{125}{2}$

Answer: B

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33. Let C_1 and C_2 be the circles $x^2 + y^2 - 2x - 2y - 2 = 0$ and $x^2 + y^2 - 6x - 6y + 14 = 0$ respectively. If P and Q are points of

intersection of these circles, then the area (in sq. units) of the quadrilateral PC_1QC_2 is :

A. 4

B. 9

C. 6

D. 8

Answer: A

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34. Let a parabola be $y = 12 - x^2$. Find the maximum area of rectangle whose base lie on x-axis and two points lie on parabola. (A) 8 (B) 4 (C) 32 (D) 34

A. 32

B. 36

C. $20\sqrt{2}$

D. $18\sqrt{3}$.

Answer: A

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35. If the vertices of the parabola be at $(-2, 0)$ and $(2, 0)$ and one of the foci be at $(-3, 0)$ then which one of the following points does not lie on the hyperbola? (a) $(-6, 2\sqrt{10})$ (b) $(2\sqrt{6}, 5)$ (c) $(4, \sqrt{15})$ (d) $(6, 5\sqrt{2})$

A. $(4, \sqrt{15})$

B. $(6, 5\sqrt{2})$

C. $(2\sqrt{6}, 5)$

D. $(-6, 2\sqrt{10})$

Answer: B

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36. if $y = mx + 7\sqrt{3}$ is normal to $\frac{x^2}{18} - \frac{y^2}{24} = 1$ then the value of m can be

A. $\frac{2}{\sqrt{5}}$

B. $\frac{4}{\sqrt{5}}$

C. $\frac{1}{\sqrt{5}}$

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

Answer: A

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37. Find the locus of mid-point of the portion of tangent intercepted between coordinate axes to the circle $x^2 + y^2 = 1$.

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

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

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

D. $x^2 + y^2 - 16x^2y^2 = 0$.

Answer:

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38. One extremity of a focal chord of $y^2 = 16x$ is $A(1, 4)$. Then the length of the focal chord at A is

A. 24

B. 25

C. 20

D. 22

Answer:

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1. For the circle $x^2 + y^2 = 25,$ the point (-2.5, 3.5) lies :

A. Inside circle

B. Outside circle

C. On the circle

D. none of these.

Answer: A

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2. If the slope of the line containg the point (2,5) and (x, - 4) is 3, then the value of x is :

A. 3

B. 1

C. 2

D. -1

Answer: D

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

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4. Find the equation of the parabola with focus (5, 0), and directrix $x = -5$. Also, find the length of the latus rectum.

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5. $4x^2 + 9y^2 = 36$

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6. Show that the points $A(1, 0), B(2, -7), C(8, 1)$ and $D(9, -6)$ all lie on the same circle. Find the equation of this circle, its centre and radius.

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7. Find the equation of the image of the circle $x^2 + y^2 + 8x - 16 + 64 = 0$ in the line mirror $x = 0$.

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8. An equilateral triangle is inscribed in the parabola = 4 ax, where one vertex is at the vertex of the parabola. Find the length of the side of the triangle.

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

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10. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. Find the equation of the hyperbola, if its eccentricity is 2.

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11. Prove that the area of the triangle inscrbed in the paravbola $y^2 = 4ax$ is

$\frac{1}{18a}|(y_1 - y_2)(y_2 - y_2)(y_3 - y_1)|$ sq. units

where y_1, y_2, y_3 are the ordinates of its vertices.

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12. Show that $4x^2 + 16y^2 - 24y - 32y - 12 = 0$ is the equatin of an ellipse ,and find its foci, vertices, eccentricity and directrices.

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