MATHS

NCERT - FULL MARKS MATHS(TAMIL)

TWO DIMENSIONAL ANALYTICAL GEOMETRY-II

Example

1. Find the equation of the circle described on the chord $3X + Y + 5 = 0$ of the circle

$x^2 + y^2 = 16$ as diameter.

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2. Examine the position of the point $(2, 3)$ with respect to the circle $x^2 + y^2 - 6x - 8y + 12 = 0$.

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3. The line $3x + 4y - 12 = 0$ meets the coordinate axes at A and B . Find the equation

of the circle drawn on AB as diameter

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4. A line $3x + 4y + 10 = 0$ cuts a chord of length 6 units on a circle with centre of the circle $(2, 1)$. Find the equation of the circle in general form.

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5. A circle of radius 3 units touches both the axes. Find the equations of all possible circles formed in the general form.

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6. Find the centre and radius of the circle $3x^2 + (a+1)y^2 + 6x - 9y + a + 4 = 0.$

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7. Find the equations of the tangent and normal to the circle $x^2 + y^2 = 25 at P(-3, 4)$.

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8. If $y = 4x + c$ is tangent to the circle $x^2 + y^2 = 9$, find c.

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9. Find the length of Latus rectum of the parabola $y^2 = 4ax$.

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10. Find the equation of the parabola with focus $\left(-\sqrt{2}, 0\right)$ and directrix $x = \sqrt{2}$.

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11. Find the equation of the parabola whose vertex is $(5, -2)$ and focus (2,-2).

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12. Find the equation of the parabola with vertex $(-1, -1)$, axis parallel to y -axis and passing through $(3, 6)$.

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13. Find the vertex, focus, directrix, and length of the latus rectum of the parabola $x^2 - 4x - 5y - 1 = 0.$

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14. Find the equation of the ellipse with foci $(\pm 2, 0)$, vertices $(\pm 3, 0)$.

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15. Find the equation of the ellipse whose eccentricity is $\frac{1}{2}$, one of the foci is (2,3) and a directrix is $x = 7$. Also find the length of the major and minor axes of the ellipse.

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16. Find the foci, vertices and length of major and minor axis of the conic

$4x^2 + 36y^2 + 40x - 288y + 532 = 0.$

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17. Find the equation of the hyperbola with vertices $(0, \pm 4)$ and foci $(0, \pm 6)$.

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18. Find the vertices, foci for the hyperbola $9x^2 - 16y^2 = 144$.

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19. The orbit of Halley's Come is an ellipse 36 18. astronomical units long and by 9 12. astronomical units wide. Find its eccentricity.

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20. Find the equations of tangent and normal to the parabola $x^2 + 6x + 4y + 5 = 0 at (1, -3)$.

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21. Find the equations of tangent and normal to the ellipse $x^2 + 4y^2 = 32$ when $\theta = \frac{\pi}{4}$.

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22. The maximum and minimum distances of the Earth from the Sun respectively are 152×10^8 km and 94.5×10^8 km. The Sun is at one focus of the elliptical orbit. Find the distance from the Sun to the other focus.

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23. A concrete bridge is designed as a parabolic arch. The road over bridge is 40m long and the maximum height of the arch is 15m . Write the equation of the parabolic arch.

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24. The parabolic communication antenna has a focus at 2m distance from the vertex of the antenna. Find the width of the antenna 3m from the vertex.

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25. search light has a parabolic reflector (has a cross section that forms a 'bowl'). The parabolic bowl is 40cm wide from rim to rim and 30cm deep. The bulb is located at the focus

What is the equation of the parabola used for reflector?

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26. An equation of the elliptical part of an optical lens system is $\frac{x^2}{16} + \frac{y^2}{9} = 1$. The parabolic part of the system has a focus in common with the right focus of the ellipse .The vertex of the parabola is at the origin and the parabola opens to the right. Determine the equation of the parabola.

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27. A room 34m long is constructed to be a whispering gallery. The room has an elliptical ceiling, as shown in Fig. 5.64. If the maximum height of the ceiling is 8m , determine where the foci are located.

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28. Certain telescopes contain both parabolic mirror and a hyperbolic mirror. In the telescope shown in the parabola and

hyperbola share focus F_1 which is 14mabove the vertex of the parabola. The hyperbola's second focus F_2 is 2m above the parabola's vertex. The vertex of the hyperbolic mirror is 1m below F_1. Position a coordinate system with the origin at the centre of the hyperbola and with the foci on the y -axis. Then find the equation of the hyperbola.

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Exercise 5 1

1. Obtain the equation of the circles with radius 5 cm and touching x-axis at the origin in general form.

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2. Find the equation of the circle with centre (2,-1) and passing through the point (3, 6) in standard form

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3. Find the equation of circles that touch both the axes and pass through(-4,-2) in general form.

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4. Obtain the equation of the circle for which (3, 4) and (2,-7) are the ends of a diameter.

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5. Find the equation of the circle through the points $(1, 0), (-1, 0),$ and $(0, 1)$.

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6. A circle of area 9π square units has two of its diameters along the lines $x + y = 5$ and $x - y = 1$. Find the equation of the circle.

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7. If $y = 2\sqrt{2}x + c$ is a tangent to the circle $x^2 + y^2 = 16,$ find the value of c.

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8. Find the equation of the tangent and normal to the circle $x^2 + y^2 - 6x + 6y - 8 = 0 at (2, 2).$

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9. Determine whether the points $(-2, 1), (0, 0)$ and $(-4, -3)$ lie outside, on or inside the circle $x^2 + y^2 - 5x + 2y - 5 = 0$.

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10. Find centre and radius of the following circles.

$x^2 + (y + 2)^2 = 0$

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11. Find centre and radius of the following circles.

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

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12. Find centre and radius of the following circles.

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

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13. Find centre and radius of the following circles.

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

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14. If the equation $3x^2 + (3 - p)xy + qy^2 - 2px = 8$ pq represents a circle, find p and q . Also determine the centre and radius of the circle.

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Exercise 5 2

1. Find the equation of the parabola in each of the cases given below:

force (4,0) and directrix x =-4.

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2. Find the equation of the parabola in each of the cases given below:

passes through (2,-3) and symmetric about y-axis.

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3. Find the equation of the parabola in each of the cases given below:

vertex (1,-2) and focus (4,-2).

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4. Find the equation of the parabola in each of the cases given below:

end points of latus rectum $(4, -8)$ and $(4, 8)$.

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5. Find the equation of the ellipse in each of the cases given below:

foci $(\pm 3, 0), e = \frac{1}{2}$.

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6. Find the equation of the ellipse in each of the cases given below:

foci $(0, \pm 4)$ and end points of major axis are $(0, \pm 5)$.

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7. Find the equation of the ellipse in each of the cases given below:

length of latus rectum 8, eccentricity $= \frac{3}{5}$ and major axis on x -axis.

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8. Find the equation of the ellipse in each of the cases given below:

length of latus rectum 4 , distance between foci $4\sqrt{2}$ and major axis as y - axis.

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9. Find the equation of the hyperbola in each of the cases given below:

foci $(\pm 2, 0)$, eccentriciy $= \frac{3}{2}$.

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10. Find the equation of the hyperbola in each of the cases given below:

Centre $(2, 1)$, one of the foci $(8, 1)$ and corresponding directrix $x = 4$

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11. Find the equation of the hyperbola in each of the cases given below:

passing through $(5, -2)$ and length of the transverse axis along x axis and of length 8 units.

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Exercise 5 3

1. Identify the type of conic section for each of the equations

$2x^2 - y^2 = 7$

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2. Identify the type of conic section for each of the equations

$3x^2 + 3y^2 - 4x + 3y + 10 = 0$

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3. Identify the type of conic section for each of the equations

$3x^2 + 2y^2 = 14$

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4. Identify the type of conic section for each of the equations

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

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5. Identify the type of conic section for each of the equations

$$11x^2 - 25y^2 - 44x + 50y - 256 = 0$$

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6. Identify the type of conic section for each of the equations

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

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Exercise 5 4

1. Find the equations of the two tangents that can be drawn from $(5, 2)$ the ellipse $2x^2 + 7y^2 = 14$.

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2. Find the equations of tangents to the hyperbola $\frac{x^2}{16} - \frac{y^2}{64} = 1$ which are parallel to $10x - 3y + 9 = 0$.

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3. Show that the line $x - y + 4 = 0$ is a tangent to the ellipse $x^2 + 3y^2 = 12$. Also find the coordinates of the point of contact

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4. Find the equation of the tangent to the parabola $y^2 = 16x$ perpendicular to $2x + 2y + 3 = 0$.

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5. Find the equation of the tangent att = 2to the parabola $y^2 = 8x$. (Hint: use parametric form)

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6. Find the equations of the tangent and normal to hyperbola $12x^2 - 9y^2 = 108\theta = \frac{\pi}{2}$. Hint: use parametric form)

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Exercise 5 5

1. A bridge has a parabolic arch that is 10m high in the centre and 30m wide at the bottom. Find the height of the arch 6m from the centre, on either sides

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2. A tunnel through a mountain for a four lane highway is to have a elliptical opening. The total width of the highway (not the opening) is to be 16m, and the height at the edge of the road must be sufficient for a truck 4m high to clear if the highest point of the opening is to be 5m approximately . How wide must the opening be?

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3. At a water fountain, water attains a maximum height of 4m at horizontal distance of 0 5. m from its origin. If the path of water is a parabola, find the height of water at a horizontal distance of 0 75. m from the point of origin

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4. An engineer designs a satellite dish with a parabolic cross section. The dish is 5m wide at

the opening, and the focus is placed 1 2. m from the vertex

Position a coordinate system with the origin at the vertex and the x -axis on the parabola's axis of symmetry and find an equation of the parabola.

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5. An engineer designs a satellite dish with a parabolic cross section. The dish is 5m wide at the opening, and the focus is placed 1 2. m

from the vertex

Find the depth of the satellite dish at the vertex.

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6. A rod of length 1 2. m moves with its ends always touching the coordinate axes. The locus of a point P on the rod, which is 0 3. m from the end in contact with x -axis is an ellipse. Find the eccentricity.

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7. Assume that water issuing from the end of a horizontal pipe, 7 5. m above the ground, describes a parabolic path. The vertex of the parabolic path is at the end of the pipe. At a position 2 5. m below the line of the pipe, the flow of water has curved outward 3m beyond the vertical line through the end of the pipe. How far beyond this vertical line will the water strike the ground?

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8. On lighting a rocket cracker it gets projected in a parabolic path and reaches a maximum height of 4m when it is 6m away from the point of projection. Finally it reaches the ground 12m away from the starting point. Find the angle of projection.

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9. Points A and B are 10km apart and it is determined from the sound of an explosion heard at those points at different times that

the location of the explosion is 6 km closer to A than B . Show that the location of the explosion is restricted to a particular curve and find an equation of it.

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Exercise 5 6

1. The equation of the circle passing through $(1, 5)$ and $(4, 1)$ and touching y-ais is

$x^2 + y^2 - 5x - 6y + 9 + \lambda(4x + 3y - 19) = 0$

where λ is equal to

A. $0, -\frac{40}{9}$

B. 0

C. $\frac{40}{9}$

D. $\frac{-40}{9}$

Answer: A

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2. The eccentricity of the hyperbola whose latus rectum 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. $\frac{3}{2}$

Answer: C

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3. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points if

A. $15 < m < 65$

B. $35 < m < 85$

C. $-85 < m < -35$

D. $-35 < m < 15$

Answer: D

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

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

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

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

Answer: C

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5. The radius of the circle $3x^2 + by^2 + 4bx - 6by + b^2 = 0$ is

A. 1

B. 3

C. $\sqrt{10}$

D. $\sqrt{11}$

Answer: C

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6. The centre of the circle inscribed in a square formed by the lines $x^2 - 8x - 12 = 0$ and $y^2 - 14y + 45 = 0$ is

A. $(4, 7)$

B. $(7, 4)$

C. $(9, 4)$

D. $(4, 9)$

Answer: A

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7. The equation of the normal to the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ which is parallel to the line $2x + 4y = 3$ is

A. $x + 2y = 3$

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

C. $2x + 2y + 3 = 0$

D. $x - 2y + 3 = 0$

Answer: A

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8. If P (x,y) be any point on $16x^2 + 25y^2 = 400$ with foci $F_1(3, 0)$ and $F_2(-3, 0)$ then $PF_1 + PF_2$ is

A. 8

B. 6

C. 10

D. 12

Answer: C

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9. The radius of the circle passing through the point $(6, 2)$ two of whose diameter are $x + y = 6$ and $x + 2y = 4$ is

A. 10

B. $2\sqrt{5}$

C. 6

D. 4

Answer: B

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10. two of whose diameter are $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is

A. $4\left(a^2 + b^2\right)$

B. $2\left(a^2 + b^2\right)$

C. $a^2 + b^2$

D. $\frac{1}{2}\left(a^2 + b^2\right)$

Answer: B

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11. If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents sto the circle $(x-3)^2 + (y+2)^2 = r^2$, then the value of r^2 is

A. 2

B. 3

C. 1

D. 4

Answer: A

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12. If $x + y = k$ is a normal to the parabola $y^2 = 12x,$ then the vlaue of k is

A. 3

B. -1

C. 1

D. 9

Answer: D

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13. The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point $(0, 4)$ circumscribes the rectangle R . The eccentricity of the ellipse is

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

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

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

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

Answer: C

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14. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the straight line $2x - y = 1$. One of parallel to the straight line

A. $\left(\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$

B. $\left(\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

C. $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

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

Answer: C

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

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

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

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

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

Answer: A

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16. Let C be the circle with centre a (1,1) and radius =1. If T is the circle centered at (0,y) passing through the origin and touching the

circleC externally, then the radius of T is equal to

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

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

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

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

Answer: D

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17. Consider an ellipse whose centre is of the origin and its major axis is along x-axis. If its eccentrcity is $\frac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral inscribed in the ellipse with diagonals as major and minor axis of the ellipse is

A. 8

B. 32

C. 80

D. 40

Answer: D

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18. Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

A. $2ab$

B. ab

C. $\sqrt{ab}$

D. $\frac{a}{b}$

Answer: A

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19. An ellipse hasOB as semi minor axes, F and F' its foci and the angle FBF' is a right angle. Then the eccentricity of the ellipse is

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

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

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

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

Answer: A

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20. The eccentricity of the ellipse $(x-3)^2+(y-4)^2=\frac{y^2}{9}$ is

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

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

C. $\frac{1}{3\sqrt{2}}$

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

Answer: B

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21. If the two tangents drawn from a point P to the parabola $Y^2 = 4x$ are at right angles then the locus of P is

A. $2x + 1 = 0$

B. $x = -1$

C. $2x - 1 = 0$

D. $x = 1$

Answer: B

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22. The circle passing through $(1, -2)$ and touching the axis of x at $(3, 0)$ and touching the axis of x at

A. $(-5, 2)$

B. $(2, -5)$

C. $(5, -2)$

D. $(-2, 5)$

Answer: C

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23. The locus of a point whose distance from $(-2, 0)$ is $\frac{2}{3}$ times its distance from the line $x = \frac{-9}{2}$ is

A. a parabola

B. a hyperbola

C. an ellipse

D. a circle

Answer: C

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24. The values of m for which the line $y = mx + 22\sqrt{5}$ touches the hyperbola $16x^2 - 9y^2 = 144$ are the roots of $x^2 - (a+b)x - 4 = 0,$ then the value of $(a+b)$ is

A. 2

B. 4

C. 0

D. -2

Answer: C

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25. If the coordinates at one end of a diameter of the circle $x^2 + y^2 - 8x - 4y + c = 0$ at are (11,2), the coordinates of the other end are

A. $(-5, 2)$

B. $(2, -5)$

C. $(5, -2)$

D. $(-2, 5)$

Answer: B

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