MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

TWO DIMENSIONAL ANALYTICAL GEOMETRY-II

Example

1. Find the general equation of a circle with centre (-3,-4) and radius 3 units.

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2. 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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3. Determine whether x+y-1=0 is the equation of a diameter of the circle $x^2 + y^2 - 6x + 4y + c = 0$ for all possible values of c.

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4. Find the general equation of the circle whose diameter is the line segment joining the points (-4,-2) and (1,1)

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5. 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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6. 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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7. A line $3x + 4y + 10 = 0$ cuts a chord of length 6units on a circle with centre of the circle (2,1). Find the equation of the circle in general form.

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8. 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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9. Find the centre and radius of the circle

$3x^2 + (a+1)y^2 + 6x - 9y + a + 4 = 0.$

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10. Find the equation of the circle passing through the points (1,1), (2,-1), and (3,2).

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

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

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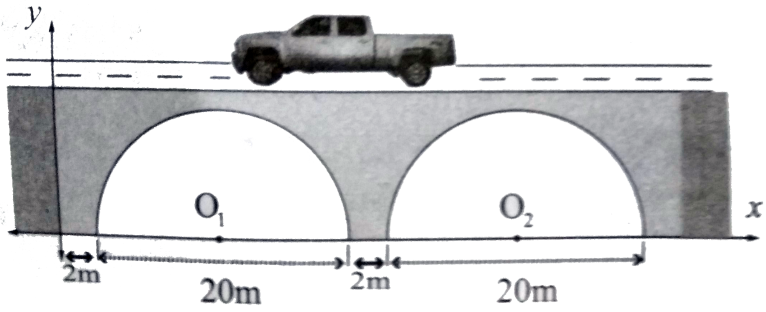
13. A road bridge over an irrigation canal have two semi circular vents each with a span of 20 m and the supporting pillars of width 2m. Use figure to write the equations that represent the

semi verticular vents.



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

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15. Find the length of Latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

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16. Find the equation of the parabola with vertex (-1, -2), axis parallel to y-axis and passing through (3, 6).

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17. The equation of the ellipse with foci $(\pm 2, 0)$ vertices $(\pm 3, 0)$ is:

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18. 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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19. For the ellipse $4x^2 + y^2 + 24x - 2y + 21 = 0$, find the centre, vertices, and the foci. Also prove that the length of latus rectum is 2.

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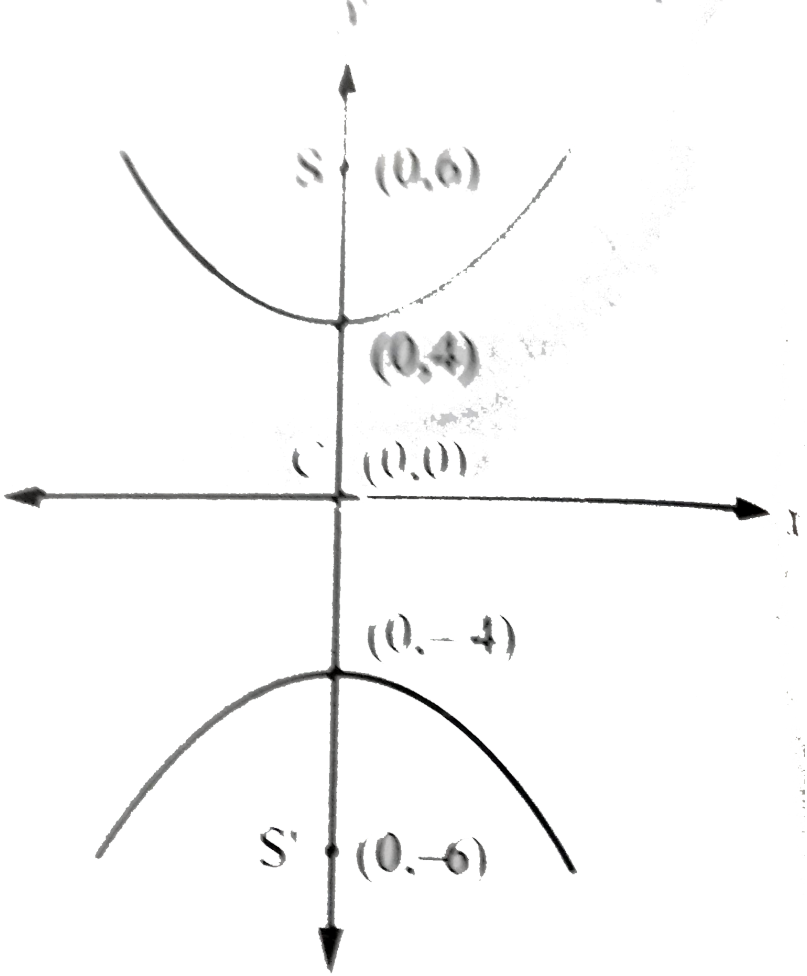
20. Find the equation of the hyperbola with vertices $(0, \pm 4)$ and foci $(0, \pm 6)$.



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

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22. Find the centre, foci, and eccentricity of the hyperbola $11x^2 - 25y^2 - 44x + 50y - 256 = 0$

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23. The orbit of Halley's comet is an ellipse 36.18 astronomical units long and 9.12 astronomical units wide. Find its eccentricity.

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24. Identify the type of the conic for the following equations:

1. $16y^2 = -4x^2 + 64$

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

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

4. $4x^2 - 9y^2 - 16x + 18y - 29 = 0$

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

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

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27. A semielliptical archway over a one-way road has height of 3m and a width of 12m. The truck has a width of 3m and a height of 2.7m. Will the truck clear the opening of the archway?

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28. The maximum and minimum distances of the Earth from the Sun respectively are 152×10^6 km and 94.5×10^6 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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29. A concrete bridge is designed as a parabolic arch. The road over bridge is 60 m long and the maximum height of the arch is 15m. What is the equation of the parabola.

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30. The parabolic communication antenna has a focus at 3m distance from the vertex of the antenna. Find the width of the antenna 8m from the vertex.

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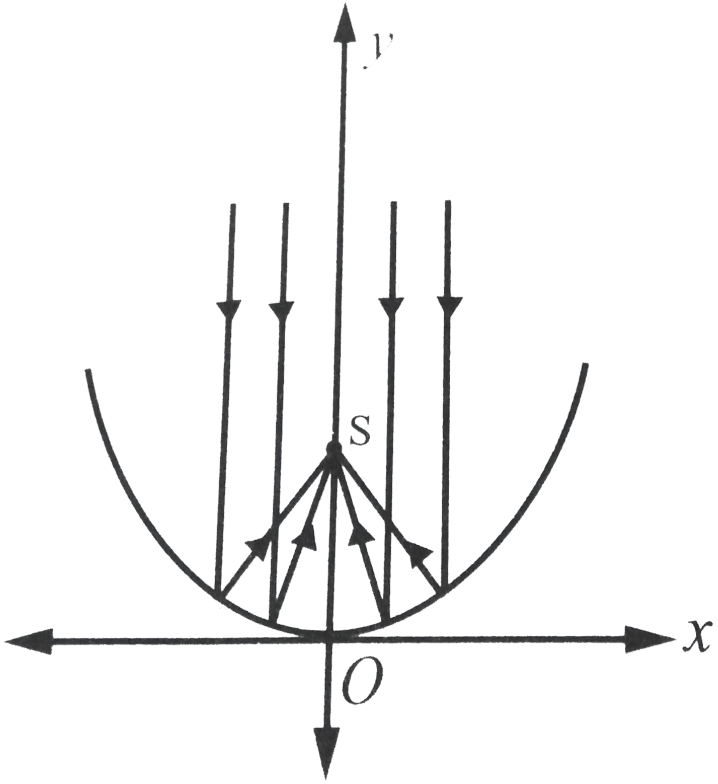
31. The equation $y = \frac{1}{32}x^2$ models cross sections of parabolic mirrors that are used for solar energy. There is a heating tube

located at the focus of each parabola, how high is this tube located above the vertex of the parabola ?



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32. A search light has a parabolic reflector (has a cross section that forms a 'bowl'). The parabolic bowl is 40 cm wide from rim

to rim and 30cm deep. The bulb is located at the focus.

(1) what is the equation of the parabola used for reflector?

(2) How far from the vertex is the bulb to be placed so that the maximum distance covered?

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

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35. If the equation of the ellipse is $\frac{(x-11)^2}{484}+\frac{y^2}{64}=1$ (x and y are measured in centimeters) where to the nearest centimeter, should the patient's kidney stone be placed so that the reflected sound hits the kidney stone?

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36. Two coast guard stations are located 600 km apart at points A(0,0) and B(0,600). A distress signal from a ship at P is received at slightly different times by two stations. It determined that the ship is 200 km farther from station A than it is from station B. Determine the equation of hyperbola that passes through the location of the help.

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37. Certain telescopes contain both parabolic mirror and a hyperbolic mirror. In the telescope shown in figure the parabola and hyperbola share focus F_1 which is 14m above 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 systemm 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 circlue 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. find the equation of the circle with centre (2,3) and passing through the intersection of the lines 3x -2y -1=0 and 4x + y -27 =0 ..

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

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

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7. 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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8. 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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9. Find the equation of the tengent and normal to the circle $x^2 + y^2 - 6x + 6y - 8 = 0 at (2, 2)$

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10. 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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11. Find centre and radius of the following circles.

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

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

(iii) $x^2 + y^2 - x + 2y - 3 = 0$

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

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

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Exercise 5 2

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

(i) Focus (4,0) and direction x = -4.

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

(iii) vertex (1,-2) and forus (4,-2)

(iv) end points of latus rectun (4,-8) and (4,8)

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

(i) foci $(-+3,0), e=\frac{1}{2}$

(ii) foci $(0,-+4)$ and end points of major axis are $(0-+5)$

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

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

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

(i) foci $(-+2,0)$ eccentricity = $\frac{3}{2}$

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

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

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4. Find the vertex ,focus , equation of directrix , and length of latus rectam of the following :

$(i) y^2 = 16x$ (ii) $x^2 = 24y$

(iii) $y^2 = -8x$ (iv) $x^2 - 2x + 8y + 17 = 0$

(v) $y^2 - 4y - 8x + 12 = 0$

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5. Identify the type of conic and find centre, foci, vertices and directries of each of the following :

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

(ii) $\frac{x^2}{3} + \frac{y^2}{10} = 1$

(iii) $\frac{x^2}{25} - \frac{y^2}{144} = 1$

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

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6. Prove that the length of the latusrection of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is $\frac{2b^2}{a}$

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7. show that the absolute value of the focal distances of any point P on the hyperbola in the length of its transverse axis.

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8. Identify the type of conic and find centre, foci, vertices, and directices of each of the following:

$$\frac{(x+1)^2}{100}+\frac{(y-2)^2}{64}=1$$

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Exercise 5 3

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

1. $2x^2-y^2=7$

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

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

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

5. $11x^2 - 25y^2 - 44x + 50y - 256 = 0$

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

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

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Exercise 5 4

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

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

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

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

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5. Find the equation of the tangent at t =2 to the parabola $y^2 = 8x$.

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6. Find the equations of the tangent and normal to hyperbola $12x^2 - 9y^2 = 108 \quad \text{at}\theta = \frac{\pi}{3}$.

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7. Prove that the point of intersection of the tangents at t_1 and t_2 on the parabola $y^2 = 4ax$ is (at1t2,a(t1+t2))

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8. if the normal at the point t_1 on the parabola $y^2 = 4ax$ meets the parabola again in the point t_2 then prove that $t_2 = -\left(t_1 + \frac{2}{t_1}\right)$

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Exercise 5 5

1. A bridge has a parabolic arch that is 10 m high in the centre and 30 m 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 or 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.

(a) 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.

(b) find the depth of the satellite dish at the vertex.

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5. Parabolic cable of a 60m portion of the roadbed of a suspension bridge are positioned as shown below. Vertical Cables are to be spaced every 6m along this portion of the roadbed. Calculate the lengths of first two of these vertical cables from the vertex.

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6. Cross section of a Nuclear cooling towar is in the shape of a hyperbola with equation $\frac{x^2}{30^2} - \frac{y^2}{44^2} = 1$. The towar is 150 m tall and the distance from the top of the towar to the centre of the hyperbola is half the distance from the base of the towar to the centre of the hyperbola. Find the diameter of the top and base of the tower.

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7. A rod of length 1.2 m moves with its ends always touching the coordinate axes. The locus of a point Pon 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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8. 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 . 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 . 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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9. On lighting a rocket cracker it gets projected in a parabolic path and reaches a maximum height of 4m when it is 6 m away from the point of projection. Finally it reaches the ground 12 m away from the starting point. Find the angle of projection.

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10. Points A and B are 10 km 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-axis 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 yhyperbola 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

$3x^2 + by^2 + 4bx - 6by + b^2 = 0$

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 $y^2 - 14 + 45 = 0$ 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 lines 2x + 4y =3 is

A. $x + 2y = 3$

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

C. $2x + 4y + 3 = 0$

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. The area of quardrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ 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: A

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11. If the normals of the paralbola y^2=4x drawn at the end points of its latus rectum are tangents to 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 value 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 ellispe 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 $\frac{x^2}{9} - \frac{y^2}{4}$ parallel to the straight line 2x - y= 1 . One of the points of contact of tangents on the hyperbola is `

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

Answer: C

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15. The equation of the circle passing through the foci ellispe $\frac{x^2}{16} + \frac{y^2}{9} = 1$ 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 at (1,1) and radius =1 . If T is the circle centered at (0,y) passing through the origin and touching the circle C 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 ellispe whose centre is of the origin and its major axis is along x-axis. If its eccentiricity is $\frac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral insricbed 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 has OB, as semi minor axis, 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 ellispse $(x-3)^2+(y-4)^2=\frac{y^2}{9}$ 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. $x = 1$b

Answer:

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

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 lines y = mx + $2\sqrt{5}$ 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 $x^2 + y^2 - 8x - 4y + c = 0$ are (11,2) the coordinates of the other end are

A. $(-5, 2)$

B. $(-3, 2)$

C. $(5, -2)$

D. $(-2, 5)$

Answer: B

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Additional Question Solved

1. find the equation of the circle with centre (2,3) and passing through the intersection of the lines 3x -2y -1=0 and 4x + y -27 =0

..

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

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3. Find the centre and radius of the following circles:

$x^2 + y^2 - 2x + 4y - 4 = 0$ and $2x^2 + 2y^2 + 16x - 28y + 32 = 0$

. Also find the ratio of their diameters.

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4. Find the equation of the circles whose radius is 4 and whish is concentric with the circle $x^2 + y^2 + 2x - 6y = 0$

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5. Show that the four points (1,0), (2,-7), (8,1) and (9,-6) are concyclic.

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6. Find the equation of a circle which passes through the points (1,-2) and (4,-3) and whose centre lies on the line 3x+4y=0

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7. Find the equation (s) of the circle passing through the points (1,1) and (2,2) and whose radius 1 .

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8. Find the equation of the ellipse if centres is $(3, -4)$ one of the foci is $(3+\sqrt{3}, -4)$ and $e = \frac{\sqrt{3}}{2}$

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9. Find the equation of the hyperbola if centre (1,-2), length of the transverse axis is 8, $e = \frac{5}{4}$ and the transverse axis is parallel to X-axis.

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10. Find axis, vertex focus and equation of directrix for $y^2 + 8x - 6y + 1 = 0$

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11. Find axis, Vertex, focus and equation of directrix for $x^2 - 6x - 12y - 3 = 0.$

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12. Find the centre, eccentricity, foci, vertices of ellipse $x^2 + 4y^2 - 8x - 16y - 68 = 0$

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13. Find the eccentricity, centre, foci, vertices of $9x^2 + 4y^2 = 36$

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14. Identify the type of conic section for each of the following equations:

$x^2 - 4y^2 + 6x + 16 - 11 = 0$

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15. Find the eccentricity, centre, foci and vertices of the following hyperbolas,

$x^2 - 3y^2 + 6x + 6y + 18 = 0$

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16. Identify the type of conic section for each of the following equations:

$x^2 - 4y^2 + 6x + 16 - 11 = 0$

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17. Identify the type of conic section for each of the following equations:

$y^2 - 8y + 4x - 3 = 0$

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18. Identify the type of conic section for each of the following equations:

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

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19. Identify the type of conic section for each of the following equations:

$16x^2 + 25y^2 = 400$

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20. Identify the type of conic section for each of the following equations:

$16x^2 + 9y^2 + 32x - 36y - 92 = 0$

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21. Identify the type of conic section for each of the following equations:

$x^2 + 4y^2 - 8x - 16y - 68 = 0$

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22. Identify the type of conic section for each of the following equations:

$x^2 + y^2 - 4x + 6y - 17 = 0$

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23. Find the equations of the tangent and normal to the parabolas: $x^2 + 2x - 4y + 4 = 0$ at (0,1)

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24. Find the equations of the tangent and normal to the parabola $y^2 = 8x$ at $t = \frac{1}{2}$

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25. Find the equations of the tangent: to the parabola $y^2 = 16x$, parallel to $3x - 2y + 5 = 0$

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26. Find the equations of the tangents: to the parabola $4x^2 - y^2 = 64$ which are parallel to $10x - 3y + 9 = 0$.

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27. Find the equations of the tangents from the point (2,-3) to the parabola $y^2 = 4x$.

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28. Find the equation of the two tangents from the point (1,2) to the hyperbola $2x^2 - 3y^2 = 6$

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29. Prove that the line $5x + 12y = 9$ touches the hyperbola $x^2 - 9y^2 = 9$ and find the point of contact.

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

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31. If a parabolic reflector is 20 cm in diameter and 5 cm deep, then its focus is

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32. The focus of a parabolic mirror is at a distance of 8cm from its centre (vertex). If the mirror 25cm deep, find the diameter of the mirror.

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33. A cable of a suspension bridge is in the form of a parabola whose span is 40m. The road way is 5m below the lowest point of the cable. If an extra support is provided across the cable 30m above the ground level. Find the length of the support if the height of the pillars are 55 mts.

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34. A kho - kho player in a practice sesssion while running realises that the sum of the distances from the two kho-kho poles from him is always 8m. Find the equation of the path traced by him of the distances between the poles is 6m.

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35. The parabola $y^2 = 4ax$ passes through the point (2,-6), the the length of its latus rectum is ....

A. 9

B. 16

C. 18

D. 6

Answer: C

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36. The vertex of the parabola $x^2 + 12x - 9y = 0$ is ...

A. $(6, -4)$

B. $(-6, 4)$

C. $(6, 4)$

D. $(-6, -4)$

Answer: D

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37. The length of the major axis of an ellipse is three times the length of minor axis, its eccentricity is ....

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

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

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

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

Answer: D

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38. The eccentricity of the ellipse $9x^2 + 4y^2 = 36$ is ...

A. $\sqrt{\frac{5}{3}}$

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

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

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

Answer: D

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39. S and T are the foci of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and B is an end of the minor axis. If STB is an equilateral triangle, the eccentricity of the ellipse is ...

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

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

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

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

Answer: C

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40. Find the sum of the focal distances of any point on the ellipse $9x^2 + 16y^2 = 144$.

A. 32

B. 18

C. 16

D. 8

Answer: D

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41. If the eccentricities of the two ellipse $\frac{x^2}{169}+\frac{y^2}{25}=1$ and $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and equal , then the value $\frac{a}{b}$, is

A. $\frac{5}{13}$

B. $\frac{6}{13}$

C. $\frac{13}{5}$

D. $\frac{13}{6}$

Answer: C

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

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

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

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

D. None of these

Answer: A

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43. If e_1 is the eccentricity of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and if e_2 is the eccentricity of the hyperbola $9x^2 - 16y^2 = 144$, then $e_1 e_2$ is.....

A. $\frac{16}{25}$

B. 1

C. Greater than 1

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

Answer: B

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44. The point of intersection of the tangent at $t_1 = t$ and $t_2 = 3t$ to the parabola $y^2 = 8x$ is ...

A. $(6t^2, 8t)$

B. $(8t, 6t^2)$

C. $(t^2, 4t)$

D. $(4t, t^2)$

Answer: A

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