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# MATHS

# BOOKS - CENGAGE

# CONIC SECTIONS

## Solved Examples And Exercises

**1.** Let $A(0, 1), B(1, 1), C(1, -1), D(-1, 0)$ be four points. If P is any other point, then $PA + PB + PCPD \geq d$, when $[d]$ is where $[.]$ represents greatest integer.

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**2.** If $\left(a\cos\theta_1, a\sin\theta_1\right), \left(a\cos\theta_2, a\sin\theta_2\right)$ and $\left(a\cos\theta_3, a\sin\theta_3\right)$ represent the vertices of an equilateral triangle inscribed in a circle, then (a)

$\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = 0$ (b) $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 0$ (c) $\tan\theta_1 + \tan\theta_2 + \tan\theta_3 = 0$ (d) $\cot\theta_1 + \cot\theta_2 + \cot\theta_3 = 0$

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**3.** A rod of length $k$ slides in a vertical plane, its ends touching the coordinate axes. Prove that the locus of the foot of the perpendicular from the origin to the rod is $\left(x^2 + y^2\right)^3 = k^2x^2y^2$.

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**4.** Prove that the circumcenter, orthocentre, incenter, and centroid of the triangle formed by the points $A(-1, 11), B(-9, -8)$, and $C(15, -2)$ are collinear, without actually finding any of them.

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**5.** If $x_1, x_2, x_3$ as well as $y_1, y_2, y_3$ are in $GP$ with the same common ratio, then the points $(x_1, y_1), (x_2, y_2)$, and $(x_3, y_3)$ (a)lie on a straight line (b)lie on an ellipse (c)lie on a circle (d) are the vertices of a triangle.

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**6.** Statement 1 :If the lines $2x + 3y + 19 = 0$ and $9x + 6y - 17 = 0$ cut the x-axis at $A, B$ and the y-axis at $C, D$, then the points, $A, B, C, D$ are concyclic. Statement 2 : Since $OA x OB = OC x OD$, where $O$ is the origin, $A, B, C, D$ are concyclic.

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**7.** If the points $(x_1, y_1), (x_2, y_2)$, and $(x_3, y_3)$ are collinear show that

$$\frac{y_2 - y_3}{x_2 x_3} + \frac{y_3 - y_1}{x_3 x_1} + \frac{y_1 - y_2}{x_1 x_2} = 0$$

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**8.** The coordinates of $A, B, C$ are $(6, 3), (-3, 5), (4, -2)$, respectively, and $P$ is any point $(x, y)$. Show that the ratio of the area of $PBC$ to that of $ABC$ is $\frac{|x + y - 2|}{7}$.

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**9.** A line cuts the x-axis at $A(7, 0)$ and the y-axis at $B(0, -5)$ A variable line PQ is drawn perpendicular to AB cutting the x-axis in P and the y-axis in Q. If AQ and BP intersect at R, find the locus of R

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**10.** Statement 1 : Let the vertices of a $ABC$ be $A(-5, -2), B(7, 6),$ and $C(5, -4)$. Then the coordinates of the circumcenter are $(1, 2)$ Statement 2 : In a right-angled triangle, the midpoint of the hypotenuse is the circumcenter of the triangle.

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**11.** If $(x, y)$ and $(x, y)$ are the coordinates of the same point referred to two sets of rectangular axes with the same origin and it $ux + vy,$ where $u$ and $v$ are independent of $xandy$ , becomes $VX + UY,$ show that $u^2 + v^2 = U^2 + V^2$.

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**12.** Two vertices of a triangle are $(5, -1)$ and $(-2, 3)$ If the orthocentre of the triangle is the origin, find the coordinates of the third point.

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**13.** The vertices of a triangle are $\left[at_1t_2, a\left(t_1 + t_2\right)\right]$, $\left[at_2t_3, a\left(t_2 + t_3\right)\right]$, $\left[at_3t_1, a\left(t_3 + t_1\right)\right]$ Then the orthocenter of the triangle is (a) $\left(-a, a\left(t_1 + t_2 + t_3\right) - at_1t_2t_3\right)$ (b) $\left(-a, a\left(t_1 + t_2 + t_3\right) + at_1t_2t_3\right)$ (c) $\left(a, a\left(t_1 + t_2 + t_3\right) + at_1t_2t_3\right)$ (d) $\left(a, a\left(t_1 + t_2 + t_3\right) - at_1t_2t_3\right)$

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**14.** If $(-6, -4), (3, 5), (-2, 1)$ are the vertices of a parallelogram, then the remaining vertex can be (a)$(0, -1)$ (b) $7, 9)$ (c)$(-1, 0)$ (d) $(-11, -8)$

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**15.** The maximum area of the triangle whose sides a,b and c satisfy $0 \leq a \leq 1, 1 \leq b \leq 2 \text{ and } 2 \leq c \leq 3$ is

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**16.** If $(-4, 0)$ and $(1, -1)$ are two vertices of a triangle of area $4squnits$, then its third vertex lies on $y = x$ (b) $5x + y + 12 = 0$ (c)$x + 5y - 4 = 0$ (d) $x + 5y + 12 = 0$

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**17.** Let $0 \equiv (0, 0), A \equiv (0, 4), B \equiv (6, 0)$ Let $P$ be a moving point such that the area of triangle $POA$ is two times the area of triangle $POB$ . The locus of $P$ will be a straight line whose equation can be

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**18.** A light ray emerging from the point source placed at $P(2, 3)$ is reflected at a point $Q$ on the y-axis. It then passes through the point $R(5, 10)$ The coordinates of $Q$ are $(0, 3)$ (b) $(0, 2)$ $(0, 5)$ (d) none of these

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**19.** If the origin is shifted to the point $\left(\frac{ab}{a-b}, 0\right)$ without rotation, then the equation $(a-b)\left(x^2+y^2\right)-2abx=0$ becomes (A) $(a-b)\left(x^2+y^2\right)-(a+b)xy+abx=a^2$ (B)$(a+b)\left(x^2+y^2\right)=2ab$ (C) $\left(x^2+y^2\right)=\left(a^2+b^2\right)$ (D)$(a-b)^2\left(x^2+y^2\right)=a^2b^2$

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**20.** In $ABC$, the coordinates of $B$ are $(0, 0)$, $AB = 2$, $\angle ABC = \frac{\pi}{3}$, and the middle point of $BC$ has coordinates $(2, 0)$. The centroid o the triangle is

(a) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ (b) $\left(\frac{5}{3}, \frac{1}{\sqrt{3}}\right)$ (c) $\left(4 + \frac{\sqrt{3}}{3}, \frac{1}{3}\right)$ (d) none of these

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**21.** A triangle ABC with vertices $A(-1, 0)$, $B(-2, 3/4)$. And $C(-3, -7)$ has orthocentre at H. then,the orthocenter of triangle to BCH will be

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**22.** In $ABC$, if the orthocentre is $(0, 0)$ and the circumcenter is (1,2), then centroid of $ABC$) is (a) $\left(\frac{1}{2}, \frac{2}{3}\right)$ (b) $\left(\frac{1}{3}, \frac{2}{3}\right)$ (c) $\left(\frac{2}{3}, 1\right)$ (d) none of these

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**23.** If the vertices of a triangle are $\left(\sqrt{5}, 0\right)$, $\left(\sqrt{3}, \sqrt{2}\right)$, and $(2, 1)$, then the orthocentre of the triangle is $\left(\sqrt{5}, 0\right)$ (b) $(0, 0)$ (c) $\left(\sqrt{5} + \sqrt{3} + 2, \sqrt{2} + 1\right)$ (d) none of these

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**24.** The vertices of a triangle are $\left(pq, \frac{1}{pq}\right)$, $\left(qr, \frac{1}{qr}\right)$, and $\left(rq, \frac{1}{rp}\right)$, where $p$, $q$ and $r$ are the roots of the equation $y^3 - 3y^2 + 6y + 1 = 0$. The coordinates of its centroid are $(1, 2)$ (b) $2, -1)$ $(1, -1)$ (d) $2, 3)$

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**25.** If two vertices of a triangle are $(-2, 3)$ and $(5, -1)$ the orthocentre lies at the origin, and the centroid on the line $x + y = 7$, then the third vertex lies at $(a)(7, 4)$ (b) (8,14)(c) (12 ,21)` (d) none of these

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**26.** $P$ and $Q$ are points on the line joining $A(-2, 5)$ and $B(3, 1)$ such that $AP = PQ = QB$. Then, the distance of the midpoint of $PQ$ from the origin is (a)3(b) $\frac{\sqrt{37}}{2}$ (c) 4 (d) 3.5

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**27.** The point (4, 1) undergoes the following three transformations successively: (a) Reflection about the line y = x (b) Translation through a distance 2 units along the positive direction of the x-axis. (c) Rotation through an angle $\frac{\pi}{4}$ about the origin in the anti clockwise direction. The final position of the point is given by the co-ordinates.

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**28.** Which of the following numbers is rational?

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**29.** If $P(1, 2)Q(4, 6), R(5, 7),$ and $S(a, b)$ are the vertices of a parallelogram $PQRS,$ then (a)$a = 2, b = 4$ (b) $a = 3, b = 4$ (c)$a = 2, b = 3$ (d) $a = 1$ or $b = -1$

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**30.** If the area of the triangle formed by the points $(2a, b)(a + b, 2b + a),$ and $(2b, 2a)$ is $2qunits,$ then the area of the triangle whose vertices are $(a + b, a - b), (3b - a, b + 3a),$ and $(3a - b, 3b - a)$ will be_____

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**31.** The incenter of the triangle with vertices $\left(1, \sqrt{3}\right), (0, 0),$ and $(2, 0)$ is (a)$\left(1, \frac{\sqrt{3}}{2}\right)$ (b) $\left(\frac{2}{3}, \frac{1}{\sqrt{3}}\right)$ (c)$\left(\frac{2}{3}, \frac{\sqrt{3}}{2}\right)$ (d) $\left(1, \frac{1}{\sqrt{3}}\right)$

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**32.** The locus of the moving point whose coordinates are given by $\left(e^{t} + e^{-t}, e^{t} - e^{-t}\right)$ where $t$ is a parameter, is (a) $xy = 1$ (b) $x + y = 2$ (c) $x^2 - y^2 = 4$ (d) $x^2 - y^2 = 2$

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**33.** The distance between the circumcenter and the orthocentre of the triangle whose vertices are $(0, 0), (6, 8),$ and $(-4, 3)$ is $\dot{L}$ Then the value of $\frac{2}{\sqrt{5}}L$ is________

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**34.** A man starts from the point $P(-3, 4)$ and reaches the point $Q(0, 1)$ touching the x-axis at $R(\alpha, 0)$ such that $PR + RQ$ is minimum. Then $5|\alpha|$ (A) 3 (B) 5 (C) 4 (D) 2

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**35.** Statement 1 : The area of the triangle formed by the points $A(1000, 1002), B(1001, 1004), C(1002, 1003)$ is the same as the area formed by the point $A'(0, 0), B'(1, 2), C'(2, 1)$ Statement 2 : The area of the triangle is constant with respect to the translation of axes.

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**36.** Consider three points $P = (-\sin(\beta - \alpha), -\cos\beta)$, $Q = (\cos(\beta - \alpha), \sin\beta)$, and $R = ((\cos(\beta - \alpha + \theta), \sin(\beta - \theta))$, where $0 < \alpha, \beta, \theta < \frac{\pi}{4}$ Then

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**37.** Consider the lines represented by equation $\left(x^2 + xy - x\right) \times (x - y) = 0$ forming a triangle. Then match the following lists:

| List I | List II |
|---|---|
| **a.** Orthocenter of triangle | **p.** (1/6, 1/2) |
| **b.** Circumcenter | **q.** $(1/(2+2\sqrt{2}), 1/2)$ |
| **c.** Centroid | **r.** (0, 1/2) |
| **d.** Incenter | **s.** (1/2, 1/2) |

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**38.** A straight line passing through $P(3, 1)$ meets the coordinate axes at $AandB$ . It is given that the distance of this straight line from the origin $O$ is maximum. The area of triangle $OAB$ is equal to $\frac{50}{3}$ $squnits$ (b) $\frac{25}{3}$ $squnits$ $\frac{20}{3}$ $squnits$ (d) $\frac{100}{3}$ $squnits$

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**39.** Let $A \equiv (3, -4), B \equiv (1, 2)$ Let $P \equiv (2k-1, 2k+1)$ be a variable point such that $PA + PB$ is the minimum. Then $k$ is (a)7/9 (b) 0 (c) 7/8 (d) none of these

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**40.** $OPQR$ is a square and $M, N$ are the middle points of the sides $PQandQR$ , respectively. Then the ratio of the area of the square to that of triangle $OMN$ is (a)4:1 (b) 2:1 (c) 8:3 (d) 7:3

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**41.** Which of the following sets of points form an equilateral triangle? (a) $(1, 0), (4, 0), (7, -1)$ (b) $(0, 0), \left(\frac{3}{2}, \frac{4}{3}\right), \left(\frac{4}{3}, \frac{3}{2}\right)$ (c) $\left(\frac{2}{3}, 0\right), \left(0, \frac{2}{3}\right), (1, 1)$ (d) None of these

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**42.** A particle $p$ moves from the point $A(0, 4)$ to the point $10, -4)$ . The particle $P$ can travel the upper-half plane $\{(x, y) \mid y \geq 0\}$ at the speed of $1m/s$ and the lower-half plane $\{(x, y) \mid y \leq 0\}$ at the speed of 2 m/s. The coordinates of a point on the x-axis, if the sum of the squares of the travel times of the upper- and lower-half planes is minimum, are (a)(1, 0) (b) (2, 0) (c) (4, 0) (d) (5, 0)

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**43.** $ABC$ is an isosceles triangle. If the coordinates of the base are $B(1, 3)$ and $C(-2, 7)$, the coordinates of vertex $A$ can be (a)$(1, 6)$ (b) $\left(-\frac{1}{2}, 5\right)$ (c) $\left(\frac{5}{6}, 6\right)$ (d) none of these

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**44.** If two vertices of a triangle are (1,3) and (4,-1) and the area of triangle is 5 sq. units, then the angle at the third vertex lies in :

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**45.** Number of points with integral co-ordinates that lie inside a triangle whose co-ordinates are (0, 0), (0, 21) and (21,0).

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**46.** Let $O(0, 0), P(3, 4),$ and $Q(6, 0)$ be the vertices of triangle $OPQ$ . The point $R$ inside the triangle $OPQ$ is such that the triangles $OPR, PQR, OQR$ are of equal area. The coordinates of $R$ are (a) $\left(\frac{4}{3}, 3\right)$ (b) $\left(3, \frac{2}{3}\right)$ (c) $\left(3, \frac{4}{3}\right)$ (d) $\left(\frac{4}{3}, \frac{2}{3}\right)$

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**47.** The orthocentre of the triangle with vertices $(0, 0), (3, 4),$ and $(4, 0)$ is (a) $\left(3, \frac{5}{4}\right)$ (b) $(3, 12)$ (c) $\left(3, \frac{3}{4}\right)$ (d) $(3, 9)$

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**48.** The area of a triangle is 5. Two of its vertices are $A(2, 1)$ and $B(3, -2)$ .

The third vertex $C$ is on $y = x + 3$. Find $C$

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**49.** If the vertices of triangle have rational coordinates, then prove that the triangle cannot be equilateral.

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**50.** If $A\left(1, p^2\right), B(0, 1)$ and $C(p, 0)$ are the coordinates of three points, then the value of $p$ for which the area of triangle $ABC$ is the minimum is $\frac{1}{\sqrt{3}}$ (b) - $\frac{1}{\sqrt{3}}$ $\frac{1}{\sqrt{2}}$ (d) none of these

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**51.** If the point $\left(x_1+t\left(x_2-x_1\right), y_1+t\left(y_2-y_1\right)\right)$ divides the join of $\left(x_1, y_1\right)$ and $\left(x_2, y_2\right)$ internally, then $t<0$ (b) `01(*d*)t=1`

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**52.** $OPQR$ is a square and $M, N$ are the midpoints of the sides $PQ$ and $QR$, respectively. If the ratio of the area of the square to that of triangle $OMN$ is $\lambda : 6$, then $\frac{\lambda}{4}$ is equal to (a)2 (b) 4 (c) 2 (d) 16

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**53.** If $\sum_{i-1}^{4}(\xi 2+yi2) \leq 2x_1x_3+2x_2x_4+2y_2y_3+2y_1y_4,$ the points $\left(x_1, y_1\right),\left(x_2, y_2\right),\left(x_3, y_3\right),\left(x_4, y_4\right)$ are the vertices of a rectangle collinear the vertices of a trapezium none of these

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**54.** In an acute triangle $ABC$, if the coordinates of orthocentre $H$ are $(4, b)$, of centroid $G$ are $(b, 2b - 8)$, and of circumcenter $S$ are $(-4, 8)$, then $b$ cannot be .

A. $a.4$

B. (b) $8$

C. (c)12 $\text{or} \ -12$

D. (d)But no common value of $b$ is possible.

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**55.** Consider the points O(0,0), A(0,1), and B(1,1) in the x-y plane. Suppose that points C(x,1) and D(1,y) are chosen such that 0ltxlt1. And such that O,C, and D are collinear. Let the sum of the area of triangles OAC and BCD be denoted by S. Then which of the following is/are correct?.

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**56.** The vertices of a triangle have integer co- ordinates then the triangle cannot be

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**57.** The locus of a point reprersented by $x = \frac{a}{2}\left(\frac{t+1}{t}\right), y = \frac{a}{2}\left(\frac{t-1}{1}\right)$, where $t \in R - \{0\}$, is $x^2 + y^2 = a^2$ (b) $x^2 - y^2 = a^2$ $x + y = a$ (d) $x - y = a$

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**58.** The points $A(0, 0)$, $B(\cos\alpha, \sin\alpha)$ and $C(\cos\beta, \sin\beta)$ are the vertices of a right-angled triangle if (a)$\sin\left(\frac{\alpha - \beta}{2}\right) = \frac{1}{\sqrt{2}}$ (b) $\cos\left(\frac{\alpha - \beta}{2}\right) = -\frac{1}{\sqrt{2}}$ (c) $\cos\left(\frac{\alpha - \beta}{2}\right) = \frac{1}{\sqrt{2}}$ (d) $\sin\left(\frac{\alpha - \beta}{2}\right) = -\frac{1}{\sqrt{2}}$

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**59.** The ends of a diagonal of a square are $(2, -3)$ and $(-1, 1)^{\cdot}$ Another vertex of the square can be a.$\left(-\frac{3}{2}, -\frac{5}{2}\right)$ (b) $\left(\frac{5}{2}, \frac{1}{2}\right)$ $\left(\frac{1}{2}, \frac{5}{2}\right)$ (d) none of these

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**60.** Point $P(p, 0), Q(q, 0), R(0, p), S(0, q)$ from (a)parallelogram (b)rhombus (c)cyclic quadrilateral (d) none of these

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**61.** A rectangular billiard table has vertices at $P(0, 0), Q(0, 7), R(10, 7),$ and $S(10, 0)^{\cdot}$ A small billiard ball starts at $M(3, 4)$, moves in a straight line to the top of the table, bounces to the right side of the table, and then comes to rest at $N(7, 1)$. The $y$ - coordinate of the point where it hits the right side is (a)3.7 (b) 3.8 (c)3.9(d) 4

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**62.** If one side of a rhombus has endpoints (4, 5) and (1, 1), then the maximum area of the rhombus is 50 sq. units (b) 25 sq. units 30 sq. units (d) 20 sq. units

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**63.** A rectangle $ABCD$, where $A \equiv (0, 0), B \equiv (4, 0), C \equiv (4, 2) D \equiv (0, 2)$ , undergoes the following transformations successively: $f_1(x, y) \vec{y}, x$ $f_2(x, y) x + \vec{3}y, y$ $f_3(x, y)(x - \vec{y})/2, (x + y)/2\Big)$ The final figure will be

A. (a)square

B. (b) a rhombus

C. (c) rectangle

D. (d) a parallelogram

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64. If a straight line through the origin bisects the line passing through the given points $(a\cos\alpha, a\sin\alpha)$ and $(a\cos\beta, a\sin\beta)$, then the lines

A. (a)are perpendicular

B. (b)are parallel

C. (c)have an angle between them of $\frac{\pi}{4}$

D. (d)none of these

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65. Let $A_r, r = 1, 2, 3, \dot{}$ , be the points on the number line such that $OA_1, OA_2, OA_3$ are in $GP,$ where $O$ is the origin, and the common ratio of the $GP$ be a positive proper fraction. Let $M,$ be the middle point of the line segment $A_rA_{r+1}.$ Then the value of $\sum_{r=1}^{\infty} OM_r$ is equal to

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**66.** The vertices of a parallelogram $ABCD$ are $A(3, 1), B(13, 6), C(13, 21),$ and $D(3, 16)$. If a line passing through the origin divides the parallelogram into two congruent parts, then the slope of the line is

A. (a) $\frac{11}{12}$

B. (b) $\frac{11}{8}$

C. (c) $\frac{25}{8}$

D. (d) $\frac{13}{8}$

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**67.** Point $A$ and $B$ are in the first quadrant; point $O$ is the origin. If the slope of $OA$ is 1, the slope of OB is 7, and $OA = OB,$ then the slope of $AB$ is $a.$ - $\frac{1}{5}$ (b) - $\frac{1}{4}$ (c) - $\frac{1}{3}$ (d) - $\frac{1}{2}$

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**68.** In a $ABC, A \equiv (\alpha, \beta), B \equiv (1, 2), C \equiv (2, 3),$ point $A$ lies on the line $y = 2x + 3,$ where $\alpha, \beta$ are integers, and the area of the triangle is $S$ such that $[S] = 2$ where $[\ .]$ denotes the greatest integer function. Then the possible coordinates of $A$ can be (a)$(-7, -11)$ (b) $(-6, -9)$ (c)$(2, 7)$ (d) $(3, 9)$

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**69.** If $y = ae^{mx} + be^{-mx},$ then $\frac{d^2y}{dx^2} - m^2y$ is equal to $m^2\left(ae^{mx} - be^{-mx}\right)$ 1 (c) 0 (d) none of these

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**70.** The vertices of a triangle are $(A(-1, -7), B(5, 1),$ and $C(1, 4)$ The equation of the bisector of $\angle ABC$ is____

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**71.** The points $\left(0, \frac{8}{3}\right)$, $(1, 3)$ , and $(82, 30)$ are the vertices of (A) an obtuse-angled triangle (B) an acute-angled triangle (C) a right-angled triangle (D) none of these

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**72.** A Point A divides the join of P(-5,1) and Q(3.5) in the ratio $k : 1$. Then the integral value of K for which the area of $\Delta ABC$. Where B is (1,5) and C is $(7, -2)$ is equal to 2 units in magnitude is

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**73.** Find the equation of the circle having center at (2,3) and which touches $x + y = 1$

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**74.** If the lines $x + y = 6andx + 2y = 4$ are diameters of the circle which passes through the point (2, 6), then find its equation.

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**75.** 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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**76.** The line $2x - y + 1 = 0$ is tangent to the circle at the point (2, 5) and the center of the circle lies on $x - 2y = 4$ . Then find the radius of the circle.

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**77.** Find the image of the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ in the line $2x - 3y + 5 = 0$

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**78.** If $x^2 + y^2 - 2x + 2ay + a + 3 = 0$ represents the real circle with nonzero radius, then find the values of $a$.

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**79.** Find the equation of the circle having radius 5 and which touches line $3x + 4y - 11 = 0$ at point (1, 2).

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**80.** If the equation $px^2 + (2 - q)xy + 3y^2 - 6qx + 30y + 6q = 0$ represents a circle, then find the values of $p and q$.

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**81.** If the lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ are tangents to a circle, then find the radius of the circle.

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**82.** Find the area of the triangle formed by the tangents from the point (4, 3) to the circle $x^2 + y^2 = 9$ and the line joining their points of contact.

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**83.** Tangents are drawn to $x^2 + y^2 = 1$ from any arbitrary point $P$ on the line $2x + y - 4 = 0$ . The corresponding chord of contact passes through a fixed point whose coordinates are $\left(\frac{1}{2}, \frac{1}{2}\right)$ (b) $\left(\frac{1}{2}, 1\right)$ $\left(\frac{1}{2}, \frac{1}{4}\right)$ (d) $\left(1, \frac{1}{2}\right)$

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**84.** Find the length of the tangent drawn from any point on the circle $x^2 + y^2 + 2gx + 2fy + c_1 = 0$ to the circle $x^2 + y^2 + 2gx + 2fy + c_2 = 0$

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**85.** Find the locus of a point which moves so that the ratio of the lengths of the tangents to the circles $x^2 + y^2 + 4x + 3 = 0$ and $x^2 + y^2 - 6x + 5 = 0$ is $2:3$.

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**86.** The tangent at any point $P$ on the circle $x^2 + y^2 = 4$ meets the coordinate axes at $AandB$ . Then find the locus of the midpoint of $AB$

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87. If a line passing through the origin touches the circle $(x - 4)^2 + (y + 5)^2 = 25$, then find its slope.

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88. If the chord of contact of the tangents drawn from the point $(h, k)$ to the circle $x^2 + y^2 = a^2$ subtends a right angle at the center, then prove that $h^2 + k^2 = 2a^2$.

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89. If the straight line $x - 2y + 1 = 0$ intersects the circle $x^2 + y^2 = 25$ at points P and Q, then find the coordinates of the point of intersection of the tangents drawn at P and Q to the circle $x^2 + y^2 = 25$.

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**90.** If the chord of contact of the tangents drawn from a point on the circle $x^2 + y^2 = a^2$ to the circle $x^2 + y^2 = b^2$ touches the circle $x^2 + y^2 = c^2$, then prove that $a, b$ and $c$ are in GP.

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**91.** The lengths of the tangents from any point on the circle $15x^2 + 15y^2 - 48x + 64y = 0$ to the two circles

$5x^2 + 5y^2 - 24x + 32y + 75 = 0$

$5x^2 + 5y^2 - 48x + 64y = 0$ are in the ratio

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**92.** Find the equation of the normal to the circle $x^2 + y^2 = 9$ at the point

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

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**93.** Find the equations of tangents to the circle $x^2 + y^2 - 22x - 4y + 25 = 0$ which are perpendicular to the line $5x + 12y + 8 = 0$

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**94.** If the length tangent drawn from the point (5, 3) to the circle $x^2 + y^2 + 2x + ky + 17 = 0$ is 7, then find the value of $k$

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**95.** A pair of tangents are drawn from the origin to the circle $x^2 + y^2 + 20(x + y) + 20 = 0$. Then find its equations.

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**96.** Find the equation of the normal to the circle $x^2 + y^2 - 2x = 0$ parallel to the line $x + 2y = 3$.

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**97.** Find the equation of the tangent to the circle $x^2 + y^2 + 4x - 4y + 4 = 0$ which makes equal intercepts on the positive coordinates axes.

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**98.** 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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**99.** Find the equation of the normals to the circle $x^2 + y^2 - 8x - 2y + 12 = 0$ at the point whose ordinate is $-1$

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**100.** An infinite number of tangents can be drawn from $(1, 2)$ to the circle $x^2 + y^2 - 2x - 4y + \lambda = 0$ . Then find the value of $\lambda$

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**101.** Find the equation of the circle which cuts the three circles $x^2 + y^2 - 3x - 6y + 14 = 0, x^2 + y^2 - x - 4y + 8 = 0,$ and $x^2 + y^2 + 2x - 6y + 9 = 0$ orthogonally.

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**102.** Find the equations to the common tangents of the circles $x^2 + y^2 - 2x - 6y + 9 = 0$ and $x^2 + y^2 + 6x - 2y + 1 = 0$

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**103.** Show that the circles $x^2 + y^2 - 10x + 4y - 20 = 0$ and $x^2 + y^2 + 14x - 6y + 22 = 0$ touch each other. Find the coordinates of the point of contact and the equation of the common tangent at the point of contact.

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**104.** If the radical axis of the circles $x^2 + y^2 + 2gx + 2fy + c = 0$ and $2x^2 + 2y^2 + 3x + 8y + 2c = 0$ touches the circle $x^2 + y^2 + 2x + 1 = 0$, show that either $g = \frac{3}{4}$ or $f = 2$

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**105.** The equation of three circles are given $x^2 + y^2 = 1, x^2 + y^2 - 8x + 15 = 0, x^2 + y^2 + 10y + 24 = 0$. Determine the coordinates of the point $P$ such that the tangents drawn from it to the circle are equal in length.

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**106.** If the circles $x^2 + y^2 + 2a'x + 2b'y + c' = 0$ and $2x^2 + 2y^2 + 2ax + 2by + c = 0$ intersect othrogonally, then prove that $aa' + bb' = c + \frac{c'}{2}$.

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**107.** A circle passes through the origin and has its center on $y = x$ If it cuts $x^2 + y^2 - 4x - 6y + 10 = -$ orthogonally, then find the equation of the circle.

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**108.** Prove that the equation of any tangent to the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ is of the form $y = m(x - 1) + 3\sqrt{1 + m^2} - 2$.

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**109.** The tangent to the circle $x^2 + y^2 = 5$ at $(1, -2)$ also touches the circle $x^2 + y^2 - 8x + 6y + 20 = 0$. Find the coordinats of the corresponding point of contact.

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**110.** If $S_1 = \alpha^2 + \beta^2 - a^2$, then angle between the tangents from $(\alpha, \beta)$ to the circle $x^2 + y^2 = a^2$, is

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**111.** If $a > 2b > 0$, then find the positive value of $m$ for which $y = mx - b\sqrt{1 + m^2}$ is a common tangent to $x^2 + y^2 = b^2$ and $(x - a)^2 + y^2 = b^2$.

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**112.** Find the angle between the two tangents from the origin to the circle $(x-7)^2+(y+1)^2=25$

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**113.** Two circles $C_1 and C_2$ intersect at two distinct points $P and Q$ in a line passing through $P$ meets circles $C_1 and C_2$ at $A and B$, respectively. Let $Y$ be the midpoint of $AB, and QY$ meets circles $C_1 and C_2$ at $X and Z$, respectively. Then prove that $Y$ is the midpoint of $XZ$.

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**114.** Find the equation of the tangent at the endpoints of the diameter of circle $(x-a)^2+(y-b)^2=r^2$ which is inclined at an angle $\theta$ with the positive x-axis.

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**115.** Find the equations of the tangents to the circle $x^2 + y^2 - 6x + 4y = 12$ which are parallel to the straight line $4x + 3y + 5 = 0$

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**116.** If from any point $P$ on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$, tangents are drawn to the circle $x^2 + y^2 + 2gx + 2fy + c\sin^2\alpha + \left(g^2 + f^2\right)\cos^2\alpha = 0$, then find the angle between the tangents.

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**117.** The lengths of the tangents from $P(1, -1)$ and $Q(3, 3)$ to a circle are $\sqrt{2}$ and $\sqrt{6}$, respectively. Then, find the length of the tangent from $R(-1, -5)$ to the same circle.

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**118.** Which of the following is a point on the common chord of the circle $x^2 + y^2 + 2x - 3y + 6 = 0$ and $x^2 + y^2 + x - 8y - 31 = 0$? (a)$(1, -2)$ (b) $(1, 4)$ $(c)(1, 2)$ (d) $1, -4)$

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**119.** If the circles $x^2 + y^2 + 2ax + cy + a = 0$ and $x^2 + y^2 - 3ax + dy - 1 = 0$ intersects at points P and Q , then find the values of $a$ for which the line $5x + by - a = 0$ passes through $PandQ$ .

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**120.** Find the angle at which the circles $x^2 + y^2 + x + y = 0$ and $x^2 + y^2 + x - y = 0$ intersect.

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**121.** Find the angle which the common chord of $x^2 + y^2 - 4y = 0$ and $x^2 + y^2 = 16$ subtends at the origin.

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**122.** If the tangents are drawn to the circle $x^2 + y^2 = 12$ at the point where it meets the circle $x^2 + y^2 - 5x + 3y - 2 = 0$, then find the point of intersection of these tangents.

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**123.** If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ bisects the circumference of the circle $x^2 + y^2 + 2g'x + 2f'y + c' = 0$ then prove that $2g'(g - g') + 2f'(f - f') = c - c'$

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**124.** Find the length of the common chord of the circles $x^2 + y^2 + 2x + 6y = 0$ and $x^2 + y^2 - 4x - 2y - 6 = 0$

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**125.** If the circle $x^2 + y^2 = 1$ is completely contained in the circle $x^2 + y^2 + 4x + 3y + k = 0$, then find the values of $k$

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**126.** Prove that the pair of straight lines joining the origin to the points of intersection of the circles $x^2 + y^2 = a$ and $x^2 + y^2 + 2(gx + fy) = 0$ is $a'\left(x^2 + y^2\right) - 4(gx + fy)^2 = 0$

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**127.** The circles $x^2 + y^2 - 12x - 12y = 0$ and $x^2 + y^2 + 6x + 6y = 0.$ touch each other externally touch each other internally intersect at two points none of these

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**128.** If $\theta$ is the angle between the two radii (one to each circle) drawn from one of the point of intersection of two circles $x^2 + y^2 = a^2$ and $(x - c)^2 + y^2 = b^2,$ then prove that the length of the common chord of the two circles is $\frac{2ab\sin\theta}{\sqrt{a^2 + b^2 - 2ab\cos\theta}}$

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**129.** If the lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ cut the coordinates axes in concyclic points, then prove that $|a_1a_2| = |b_1b_2|.$

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**130.** A line is drawn through a fix point P$(\alpha, \beta)$ to cut the circle $x^2 + y^2 = r^2$ at A and B. Then PA.PB is equal to :

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**131.** Circles are drawn through the point (2, 0) to cut intercept of length 5 units on the x-axis. If their centers lie in the first quadrant, then find their equation.

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**132.** Find the equation of the circle passing through the origin and cutting intercepts of lengths 3 units and 4 unitss from the positive exes.

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**133.** Find the point of intersection of the circle $x^2 + y^2 - 3x - 4y + 2 = 0$ with the x-axis.

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**134.** Find the values of $k$ for which the points $(2k, 3k), (1, 0), (0, 1), and(0, 0)$ lie on a circle.

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**135.** If one end of the diameter is (1, 1) and the other end lies on the line $x + y = 3$ , then find the locus of the center of the circle.

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**136.** Tangent drawn from the point $P(4, 0)$ to the circle $x^2 + y^2 = 8$ touches it at the point $A$ in the first quadrant. Find the coordinates of another point $B$ on the circle such that $AB = 4$ .

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**137.** If the join of $(x_1, y_1)$ and $(x_2, y_2)$ makes on obtuse angle at $(x_3, y_3)$, then prove than $(x_3 - x_1)(x_3 - x_2) + (y_3 - y_1)(y_3 - y_2) < 0$

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**138.** Find the range of values of $m$ for which the line $y = mx + 2$ cuts the circle $x^2 + y^2 = 1$ at distinct or coincident points.

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**139.** Centre of the circle whose radius is 3 and which touches internally the circle $x^2 + y^2 - 4x - 6y - 12 = 0$ at the point (-1 -1) is

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**140.** Find the number of common tangents that can be drawn to the circles $x^2 + y^2 - 4x - 6y - 3 = 0$ and $x^2 + y^2 + 2x + 2y + 1 = 0$

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**141.** Find the equation of the radical axis of $x^2 + y^2 - 2x - 4y - 1 = 0, x^2 + y^2 - 4x - 6y + 5 = 0.$

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**142.** Two circles $C_1$ and $C_2$ intersect in such a way that their common chord is of maximum length. The center of $C_1$ is (1, 2) and its radius is 3 units. The radius of $C_2$ is 5 units. If the slope of the common chord is $\frac{3}{4}$, then find the center of $C_2$.

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**143.** The equation of a circle is $x^2 + y^2 = 4$. Find the center of the smallest circle touching the circle and the line $x + y = 5\sqrt{2}$

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**144.** Consider four circles $(x \pm 1)^2 + (y \pm 1)^2 = 1$ . Find the equation of the smaller circle touching these four circles.

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**145.** Consider the circles $x^2 + (y - 1)^2 = 9$, $(x - 1)^2 + y^2 = 25$. They are such that these circles touch each other one of these circles lies entirely inside the other each of these circles lies outside the other they intersect at two points.

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**146.** If the circles of same radius $a$ and centers at $(2, 3)$ and $(5, 6)$ cut orthogonally, then find $a$.

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**147.** If the two circles $2x^2 + 2y^2 - 3x + 6y + k = 0$ and $x^2 + y^2 - 4x + 10y + 16 = 0$ cut orthogonally, then find the value of $k$ .

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**148.** Find the condition that the circle $(x - 3)^2 + (y - 4)^2 = r^2$ lies entirely within the circle $x^2 + y^2 = R^2$ .

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**149.** Find the locus of the center of the circle which cuts off intercepts of lengths $2aand2b$ from the x-and the y-axis, respectively.

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**150.** Find the equation of the circle with center at $(3, -1)$ and which cuts off an intercept of length 6 from the line $2x - 5y + 18 = 0$

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**151.** Find the equation of the circle which touches both the axes and the line $x = c$

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**152.** Find the equation of the circle which touches the x-axis and whose center is (1, 2).

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**153.** Find the equations of the circles which pass through the origin and cut off chords of length $a$ from each of the lines $y = x and y = -x$

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**154.** Find the radius of the circle $(x - 5)(x - 1) + (y - 7)(y - 4) = 0$ .

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**155.** Prove that the locus of the centroid of the triangle whose vertices are $(a\cos t, a\sin t), (b\sin t, -b\cos t)$, and $(1, 0)$ , where $t$ is a parameter, is circle.

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**156.** If one end of the a diameter of the circle $2x^2 + 2y^2 - 4x - 8y + 2 = 0$ is (3, 2), then find the other end of the diameter.

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**157.** If a circle whose center is $(1, -3)$ touches the line $3x - 4y - 5 = 0$, then find its radius.

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**158.** The locus of a point which moves such that the sum of the square of its distance from three vertices of a triangle is constant is a/an

(a)circle (b) straight line (c) ellipse (d) none of these

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**159.** The number of integral values of $\lambda$ for which the equation $x^2 + y^2 + \lambda x + (1 - \lambda)y + 5 = 0$ is the equation fo a circle whose radius cannot exceed $5,$ is 14 (b) 18 (c) 16 (d) none of these

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**160.** Find the points on the circle $x^2 + y^2 - 2x + 4y - 20 = 0$ which are the farthest and nearest to the point $( - 5, 6)$

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**161.** If the line $x\cos\theta + y\sin\theta = 2$ is the equation of a transverse common tangent to the circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 6\sqrt{3}x - 6y + 20 = 0$ , then the value of $\theta$ is (a) $\frac{5\pi}{6}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

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**162.** Find the values of $\alpha$ for which the point $(\alpha - 1, \alpha + 1)$ lies in the larger segment of the circle $x^2 + y^2 - x - y - 6 = 0$ made by the chord whose equation is $x + y - 2 = 0$

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**163.** Statement 1 : The equation of chord through the point $(-2, 4)$ which is farthest from the center of the circle $x^2 + y^2 - 6x + 10y - 9 = 0$ is $x + y - 2 = 0$ . Statement 1 : In notations, the equation of such chord of the circle $S = 0$ bisected at $\left(x_1, y_1\right)$ must be $T = S^{\cdot}$

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**164.** Find the equations of the circles passing through the point $(-4, 3)$ and touching the lines $x + y = 2$ and $x - y = 2$

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**165.** Statement 1 : If two circles $x^2 + y^2 + 2gx + 2fy = 0$ and $x^2 + y^2 + 2g'x + 2f'y = 0$ touch each other, then $f'g = fg'^{\cdot}$ Statement 2 : Two circles touch other if the line joining their centers is perpendicular to all possible common tangents.

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166. Find the greatest distance of the point $P(10, 7)$ from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$

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167. Statement 1 : If the circle with center $P(t, 4 - 2t), t \in R,$ cut the circles $x^2 + y^2 = 16$ and $x^2 + y^2 - 2x - y - 12 = 0$ , then both the intersections are orthogonal. Statement 2 : The length of tangent from $P$ for $t \in R$ is the same for both the given circles.

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168. Find the area of the region in which the points satisfy the inequaties $4 < x^2 + y^2 < 16$ and $3x^2 - y^2 \geq 0.$

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**169.** If points $A and B$ are (1, 0) and (0, 1), respectively, and point $C$ is on the circle $x^2 + y^2 = 1$, then the locus of the orthocentre of triangle $ABC$ is (a) $x^2 + y^2 = 4$ (b) $x^2 + y^2 - x - y = 0$ (c) $x^2 + y^2 - 2x - 2y + 1 = 0$ (d) $x^2 + y^2 + 2x - 2y + 1 = 0$

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**170.** If the line $x + 2by + 7 = 0$ is a diameter of the circle $x^2 + y^2 - 6x + 2y = 0$, then find the value of $b$

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**171.** Find the number of point $(x, y)$ having integral coordinates satisfying the condition $x^2 + y^2 < 25$

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**172.** The circle $x^2 + y^2 - 6x - 10y + k = 0$ does not touch or intersect the coordinate axes, and the point (1, 4) is inside the circle. Find the range of value of $k^{\cdot}$

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**173.** Statement 1 :The circles $x^2 + y^2 + 2px + r = 0$ and $x^2 + y^2 + 2qy + r = 0$ touch if $\frac{1}{p^2} + \frac{1}{q^2} = \frac{1}{r} \cdot$ Statement 2 : Two centers $C_1 and C_2$ and radii $r_1 and r_2$, respectively, touch each other if $|r_1 \pm r_2| = c_1 c_2^{\cdot}$

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**174.** If the circle $x^2 + y^2 + 2x + 3y + 1 = 0$ cuts $x^2 + y^2 + 4x + 3y + 2 = 0$ at $A and B$, then find the equation of the circle on $AB$ as diameter.

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**175.** If the radii of the circles $(x - 1)^2 + (y - 2)^2 = 1$ and $(x - 7)^2 + (y - 10)^2 = 4$ are increasing uniformly w.r.t. time as 0.3 units/s and 0.4 unit/s, respectively, then at what value of $t$ will they touch each other?

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**176.** $AandB$ are two points in the xy-plane, which are $2\sqrt{2}$ units distance apart and subtend an angle of $90^0$ at the point $C(1, 2)$ on the line $x - y + 1 = 0$ , which is larger than any angle subtended by the line segment $AB$ at any other point on the line. Find the equation(s) of the circle through the points $A, BandC$

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**177.** Two circles with radii $aandb$ touch each other externally such that $\theta$ is the angle between the direct common tangents, $(a > b \geq 2)$ . Then prove that $\theta = 2\sin^{-1}\left(\frac{a - b}{a + b}\right)$.

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**178.** From the variable point $A$ on circle $x^2 + y^2 = 2a^2$, two tangents are drawn to the circle $x^2 + y^2 = a^2$ which meet the curve at $BandC^{\cdot}$ Find the locus of the circumcenter of $ABC^{\cdot}$

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**179.** Two fixed circles with radii $r_1 and r_2, \left(r_1 > r_2\right)$, respectively, touch each other externally. Then identify the locus of the point of intersection of their direction common tangents.

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**180.** If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is touched by $y = x$ at $P$ such that $OP = 6\sqrt{2}$, then the value of $c$ is (a)36 (b) 144 (c) 72 (d) none of these

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**181.** Find the radius of the smallest circle which touches the straight line $3x - y = 6$ at $(1, -3)$ and also touches the line $y = x$ . Compute up to one place of decimal only.

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**182.** The number of points $P(x, y)$ lying inside or on the circle $x^2 + y^2 = 9$ and satisfying the equation $\tan^4 x + \cot^4 x + 2 = 4\sin^2 y$ is_____

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**183.** $C_1$ and $C_2$ are circle of unit radius with centers at (0, 0) and (1, 0), respectively, $C_3$ is a circle of unit radius. It passes through the centers of the circles $C_1 and C_2$ and has its center above the x-axis. Find the equation of the common tangent to $C_1 and C_3$ which does not pass through $C_2$.

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**184.** The area of the triangle formed by the positive $x$ - axis and the normal and tangent to the circle $x^2 + y^2 = 4$ at $\left(1, \sqrt{3}\right)$ is (a)$2\sqrt{3}squnits$. (b) $3\sqrt{2}squnits$. (c)$\sqrt{6}squnits$. (d) none of these

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**185.** Find the equation of the smallest circle passing through the intersection of the line $x + y = 1$ and the circle $x^2 + y^2 = 9$

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186. Let $P$ be a point on the circle $x^2 + y^2 = 9$, $Q$ a point on the line $7x + y + 3 = 0$, and the perpendicular bisector of $PQ$ be the line $x - y + 1 = 0$. Then the coordinates of $P$ are $(0, -3)$ (b) $(0, 3)$ $\left(\frac{72}{25}, \frac{21}{35}\right)$ (d) $\left(-\frac{72}{25}, \frac{21}{25}\right)$

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187. Show that the equation of the circle passing through (1, 1) and the points of intersection of the circles $x^2 + y^2 + 13x - 3y = 0$ and $2x^2 + 2y^2 + 4x - 7y - 25 = 0$ is $4x^2 + 4y^2 + 30x - 13y - 25 = 0$.

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188. A straight line moves such that the algebraic sum of the perpendiculars drawn to it from two fixed points is equal to $2k$. Then, then straight line always touches a fixed circle of radius. (a) $2k$ (b) $\frac{k}{2}$ (c) $k$ (d) none of these

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**189.** Let $S_1$ be a circle passing through $A(0, 1)$ and $B(-2, 2)$ and $S_2$ be a circle of radius $\sqrt{10}$ units such that $AB$ is the common chord of $S_1 and S_2$. Find the equation of $S_2$.

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**190.** The coordinates of the middle point of the chord cut-off by $2x - 5y + 18 = 0$ by the circle $x^2 + y^2 - 6x + 2y - 54 = 0$ are (a)$(1, 4)$ (b) $(2, 4)$ (c) $(4, 1)$ (d) $(1, 1)$

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**191.** A variable circle which always touches the line $x + y - 2 = 0$ at (1, 1) cuts the circle $x^2 + y^2 + 4x + 5y - 6 = 0$. Prove that all the common chords of intersection pass through a fixed point. Find that points.

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**192.** The line $x + 3y = 0$ is a diameter of the circle $x^2 + y^2 - 6x + 2y = 0$

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**193.** Find the equation of the circle which is touched by $y = x$ , has its center on the positive direction of the x=axis and cuts off a chord of length 2 units along the line $\sqrt{3}y - x = 0$

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**194.** Find the locus of the centers of the circles $x^2 + y^2 - 2ax - 2by + 2 = 0$ , where $a$ and $b$ are parameters, if the tangents from the origin to each of the circles are orthogonal.

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**195.** A circle touches the y-axis at the point (0, 4) and cuts the x-axis in a chord of length 6 units. Then find the radius of the circle.

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**196.** Three concentric circles of which the biggest is $x^2 + y^2 = 1$, have their radii in A.P If the line $y = x + 1$ cuts all the circles in real and distinct points. The interval in which the common difference of the A.P will lie is:

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**197.** Tangents $PAandPB$ are drawn to $x^2 + y^2 = a^2$ from the point $P\left(x_1, y_1\right)^{\cdot}$ Then find the equation of the circumcircle of triangle $PAB^{\cdot}$

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**198.** Let $A \equiv (-1, 0), B \equiv (3, 0),$ and $PQ$ be any line passing through (4, 1) having slope $m^{\cdot}$ Find the range of $m$ for which there exist two points on

$PQ$ at which $AB$ subtends a right angle.

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**199.** If the abscissa and ordinates of two points $PandQ$ are the roots of the equations $x^2 + 2ax - b^2 = 0$ and $x^2 + 2px - q^2 = 0$ , respectively, then find the equation of the circle with $PQ$ as diameter.

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**200.** The equation of radical axis of two circles is $x + y = 1$. One of the circles has the ends ofa diameter at the points $(1, -3)$ and $(4, 1)$ and the other passes through the point (1, 2).Find the equating of these circles.

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**201.** Find the parametric form of the equation of the circle $x^2 + y^2 + px + py = 0.$

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**202.** The point on a circle nearest to the point $P(2, 1)$ is at a distance of 4 units and the farthest point is (6, 5). Then find the equation of the circle.

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**203.** $S(x, y) = 0$ represents a circle. The equation $S(x, 2) = 0$ gives two identical solutions: $x = 1$ . The equation $S(1, y) = 0$ given two solutions: $y = 0, 2$. Find the equation of the circle.

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**204.** Find the length of intercept, the circle $x^2 + y^2 + 10x - 6y + 9 = 0$ makes on the x-axis.

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**205.** Find the equation of the family of circles touching the lines $x^2 - y^2 + 2y - 1 = 0.$

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**206.** Find the center of the circle $x = -1 + 2\cos\theta, y = 3 + 2\sin\theta$

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**207.** Find the equation of the circle which touches both the axes and the straight line $4x + 3y = 6$ in the first quadrant and lies below it.

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**208.** If the intercepts of the variable circle on the x- and yl-axis are 2 units and 4 units, respectively, then find the locus of the center of the variable circle.

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**209.** The angle between the pair of tangents drawn from a point $P$ to the circle $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is $2\alpha$ . then the equation of the locus of the point $P$ is

A. a.$x^2 + y^2 + 4x - 6y + 4 = 0$

B. b. $x^2 + y^2 + 4x - 6y - 9 = 0$

C. c. $x^2 + y^2 + 4x - 6y - 4 = 0$

D. d. $x^2 + y^2 + 4x - 6y + 9 = 0$

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**210.** Two rods of lengths $aandb$ slide along the $x$ and $y$ - $axis$, respectively, in such a manner that their ends are concyclic. Find the locus of the center of the circle passing through the endpoints.

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**211.** If a circle passes through the point of intersection of the lines $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$ with the coordinate axis, then value of $\lambda$ is

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**212.** A circle with center at the origin and radius equal to a meets the axis of $x$ at $AandB\dot{P}(\alpha)$ and $Q(\beta)$ are two points on the circle so that $\alpha - \beta = 2y$ , where $\gamma$ is a constant. Find the locus of the point of intersection of $AP$ and $B\dot{Q}$

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**213.** Two vertices of an equilateral triangle are $( - 1, 0)$ and $(1, 0)$ then its circumcircle is

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**214.** The locus of the point of intersection of the tangents to the circle $x^2 + y^2 = a^2$ at points whose parametric angles differ by $\frac{\pi}{3}$.

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**215.** If two distinct chords, drawn from the point (p, q) on the circle $x^2 + y^2 = px + qy$ (where $pq \neq q$) are bisected by the x-axis, then (a)$p^2 = q^2$ (b) $p^2 = 8q^2$ (c)$p^2 < 8q^2$ (d) $p^2 > 8q^2$

Watch Video Solution

**216.** Find the locus of the center of the circle touching the circle $x^2 + y^2 - 4y - 2x = 2\sqrt{3} - 1 Internally\ \text{and}\ \tan \geq ntsonwhichom(1, 2)aremak \in gof$

60^0` with each other.

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**217.** If the line $ax + by = 2$ is a normal to the circle $x^2 + y^2 - 4x - 4y = 0$ and a tangent to the circle $x^2 + y^2 = 1$, then $a$ and $b$ are

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**218.** If a line segement $AM = a$ moves in the plane $XOY$ remaining parallel to $OX$ so that the left endpoint $A$ slides along the circle $x^2 + y^2 = a^2$, then the locus of $M$

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**219.** The ends of a quadrant of a circle have the coordinates (1, 3) and (3, 1). Then the center of such a circle is

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**220.** The tangents to $x^2 + y^2 = a^2$ having inclinations $\alpha$ and $\beta$ intersect at $\dot{P}$ If $\cot\alpha + \cot\beta = 0$ , then find the locus of $\dot{P}$

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**221.** If the length of a common internal tangent to two circles is 7, and that of a common external tangent is 11, then the product of the radii of the two circles is (A) $36$ (B) $9$ (C) $18$ (D) $4$

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**222.** If $C_1, C_2, andC_3$ belong to a family of circles through the points $\left(x_1, y_2\right)and\left(x_2, y_2\right)$ prove that the ratio of the length of the tangents from any point on $C_1$ to the circles $C_2andC_3$ is constant.

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**223.** Two circle are externally tangent. Lines $PAB$ and $PA'B'$ are common tangents with $AandA'$ on the smaller circle and $B^{'}andB'$ the on the larger circle. If $PA = AB = 4,$ then the square of the radius of the circle is__________

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**224.** Prove that quadrilateral $ABCD$, where $AB \equiv x + y - 10, BC \equiv x - 7y + 50 = 0, CD \equiv 22x - 4y + 125 = 0, andDA \equiv 2x - 4y$ is concyclic. Also find the equation of the circumcircle of $ABCD^{.}$

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**225.** Statement 1 : Let $S_1 : x^2 + y^2 - 10x - 12y - 39 = 0$, $S_2x^2 + y^2 - 2x - 4y + 1 = 0$ and $S_3 : 2x^2 + 2y^2 - 20x - 24y - 78 = 0$. The radical center of these circles taken pairwise is $(-2, -3)^{.}$ Statement 2 :

The point of intersection of three radical axes of three circles taken in pairs is known as the radical center.

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**226.** Find the locus of the midpoint of the chords of the circle $x^2 + y^2 = a^2$ which subtend a right angle at the point $(0, 0)$

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**227.** Let the lines $(y - 2) = m_1(x - 5)$ and $(y + 4) = m_2(x - 3)$ intersect at right angles at $P$ (where $m_1 and m_2$ are parameters). If the locus of $P$ is $x^2 + y^2 gx + fy + 7 = 0$, then the value of $|f + g|$ is________

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**228.** A variable circle passes through the point $A(a, b)$ and touches the x-axis. Show that the locus of the other end of the diameter through $A$ is

$(x - a)^2 = 4by$.

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**229.** Find the equation of the circle if the chord of the circle joining (1, 2) and $( - 3, 1)$ subtents $90^0$ at the center of the circle.

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**230.** Find the equation of the circle which passes through (1, 0) and (0, 1) and has its radius as small as possible.

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**231.** Tangents are drawn from the origin to the circle $x^2 + y^2 - 2hx - 2hy + h^2 = 0, (h \geq 0)$ Statement 1 : Angle between the tangents is $\frac{\pi}{2}$ Statement 2 : The given circle is touching the coordinate axes.

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**232.** Let A (-2,2)and B (2,-2) be two points AB subtends an angle of $45^\circ$ at any points P in the plane in such a way that area of $\Delta PAB$ is 8 square unit, then number of possibe position(s) of P is

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**233.** Consider the family of circles $x^2 + y^2 - 2x - 2\lambda y - 8 = 0$ passing through two fixed points $AandB$ . Then the distance between the points $AandB$ is____

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**234.** If a circle passes through the point $(0, 0), (a, 0)and(0, b)$ , then find its center.

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**235.** The line $3x + 6y = k$ intersects the curve $2x^2 + 3y^2 = 1$ at points $AandB$ . The circle on $AB$ as diameter passes through the origin. Then the value of $k^2$ is________

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**236.** Find the equation of the circle which passes through the points (1,-2), (4,-3) and whose center lies on the line 3x+4y=7.

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**237.** If $x, y \in R$ satisfies $(x + 5)^2 + (y - 12)^2 = (14)^2$, then the minimum value of $\sqrt{x^2 = y^2}$ is________

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**238.** Show that a cyclic quadrilateral is formed by the lines $5x + 3y = 9, x = 3y, 2x = y,$ and $x + 4y + 2 = 0$ taken in order . Find the equation of the circumcircle.

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**239.** A circle $x^2 + y^2 + 4x - 2\sqrt{2}y + c = 0$ is the director circle of the circle $S_1 and S_1$ is the director circle of circle $S_2,$ and so on. If the sum of radii of all these circles is 2, then the value of $c$ is $k\sqrt{2}$ , where the value of $k$ is__________

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**240.** A point $P$ moves in such a way that the ratio of its distance from two coplanar points is always a fixed number $( \neq 1)$ . Then, identify the locus of the point.

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**241.** The sum of the slopes of the lines tangent to both the circles $x^2 + y^2 = 1$ and $(x - 6)^2 + y^2 = 4$ is_______

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**242.** Prove that the maximum number of points with rational coordinates on a circle whose center is $\left(\sqrt{3}, 0\right)$ is two.

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**243.** Let $C_1$ and $C_2$ are circles defined by $x^2 + y^2 - 20x + 64 = 0$ and $x^2 + y^2 + 30x + 144 = 0$. The length of the shortest line segment PQ that is tangent to $C_1$ at P and to $C_2$ at Q is

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**244.** Prove that for all values of $\theta$ , the locus of the point of intersection of the lines $x\cos\theta + y\sin\theta = a$ and $x\sin\theta - y\cos\theta = b$ is a circle.

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**245.** The chord of contact of tangents from a point $P$ to a circle passes through $\dot{Q}$ If $l_1 and l_2$ are the length of the tangents from $PandQ$ to the circle, then $PQ$ is equal to

A. (a) $\dfrac{l_1 + l_2}{2}$

B. (b) $\dfrac{l_1 - l_2}{2}$

C. (c) $\sqrt{l12 + l22}$

D. (d) $2\sqrt{l12 + l22}$

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**246.** Find the length of the chord $x^2 + y^2 - 4y = 0$ along the line $x + y = 1$. Also find the angle that the chord subtends at the circumference of the larger segment.

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**247.** The chords of contact of tangents from three points $A, BandC$ to the circle $x^2 + y^2 = a^2$ are concurrent. Then $A, BandC$ will (a)be concyclic (b) be collinear (c)form the vertices of a triangle (d)none of these

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**248.** Tangents are drawn to the circle $x^2 + y^2 = a^2$ from two points on the x-axis , equidistant from the point (k,0). Show that the locus of their point of intersection is $ky^2 = a^2(k - x)$.

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**249.** $P$ is the variable point on the circle with center at $CCA$ and $CB$ are perpendiculars from $C$ on the x- and the y-axis, respectively. Show that the locus of the centroid of triangle $PAB$ is a circle with center at the centroid of triangle $CAB$ and radius equal to the one-third of the radius of the given circle.

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**250.** If the angle between the tangents drawn to $x^2 + y^2 + 2gx + 2fy + c = 0$ from (0, 0) is $\frac{\pi}{2}$, then (a) $g^2 + f^2 = 3c$ (b) $g^2 + f^2 = 2c$ (c) $g^2 + f^2 = 5c$ (d) $g^2 + f^2 = 4c$

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**251.** Find the locus of center of circle of radius 2 units, if intercept cut on the x-axis is twice of intercept cut on the y-axis by the circle.

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**252.** Any circle through the point of intersection of the lines $x + \sqrt{3}y = 1$ and $\sqrt{3}x - y = 2$ intersects these lines at points $PandQ$ . Then the angle subtended by the arc $PQ$ at its center is (a)$180^0$ (b) $90^0$ (c) $120^0$ depends on center and radius

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**253.** A straight line moves so that the product of the length of the perpendiculars on it from two fixed points is constant. Prove that the locus of the feet of the perpendiculars from each of these points upon the straight line is a unique circle.

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**254.** The number of such points $\left(a + 1, \sqrt{3}a\right)$, where a is any integer, lying inside the region bounded by the circles $x^2 + y^2 - 2x - 3 = 0$ and $x^2 + y^2 - 2x - 15 = 0$, is

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**255.** A tangent is drawn to each of the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 = b^2$. Show that if the two tangents are mutually perpendicular, the locus of their point of intersection is a circle concentric with the given circles.

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**256.** Perpendiculars are drawn, respectively, from the points $PandQ$ to the chords of contact of the points $QandP$ with respect to a circle. Prove that the ratio of the lengths of perpendiculars is equal to the ratio of the distances of the points $PandQ$ from the center of the circles.

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**257.** Find the locus of the midpoint of the chord of the circle $x^2 + y^2 - 2x - 2y = 0$, which makes an angle of $120^0$ at the center.

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**258.** Find the center of the smallest circle which cuts circles $x^2 + y^2 = 1$ and $x^2 + y^2 + 8x + 8y - 33 = 0$ orthogonally.

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**259.** A point moves such that the sum of the square of its distances from two fixed straight lines intersecting at angle $2\alpha$ is a constant. Prove that the locus of points is an ellipse

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**260.** From a point $P$ on the normal $y = x + c$ of the circle $x^2 + y^2 - 2x - 4y + 5 - \lambda^2 - 0$, two tangents are drawn to the same circle touching it at point $BandC$ . If the area of quadrilateral $OBPC$ (where $O$ is the center of the circle) is 36 sq. units, find the possible values of $\dot{\lambda}$ It is given that point $P$ is at distance $|\lambda|\left(\sqrt{2} - 1\right)$ from the circle.

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261. The circle $x^2 + y^2 - 4x - 4y + 4 = 0$ is inscribed in a variable triangle $OAB$. Sides $OA$ and $OB$ lie along the x- and y-axis, respectively, where $O$ is the origin. Find the locus of the midpoint of side $AB$.

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262. Consider three circles $C_1, C_2$ and $C_3$ such that $C_2$ is the director circle of $C_1$, and $C_3$ is the director circlÃ© of $C_2$. Tangents to $C_1$, from any point on $C_3$ intersect $C_2$, at $P^2$ and $Q$. Find the angle between the tangents to $C_2^2$ at P and Q. Also identify the locus of the point of intersection of tangents at $P$ and $Q$.

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**263.** The line $9x + y - 18 = 0$ is the chord of contact of the point $P(h, k)$ with respect to the circle $2x^2 + 2y^2 - 3x + 5y - 7 = 0$, for (a) $\left(\frac{24}{5}, -\frac{4}{5}\right)$ (b) $P(3, 1)$ (c) $P(-3, 1)$ (d) $\left(-\frac{2}{5}, \frac{12}{5}\right)$

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**264.** A circle $x^2 + y^2 + 4x - 2\sqrt{2}y + c = 0$ is the director circle of circle $S_1$ and $S_2$, is the director circle of circle $S_1$, and so on. If the sum of radii of all these circles is 2, then find the value of c.

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**265.** If the tangents are drawn to the circle $x^2 + y^2 = 12$ at the points where it meets the circle $x^2 + y^2 - 5x + 3y - 2 = 0$, then find the point of intersection of thse tangents. Also, find the length of common chord.

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**266.** Find the length of the chord of contact with respect to the point on the director circle of circle $x^2 + y^2 + 2ax - 2by + a^2 - b^2 = 0$ .

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**267.** The distance between the chords of contact of tangents to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ from the origin & the point (g,f) is

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**268.** If $3x + y = 0$ is a tangent to a circle whose center is $(2, -1)$ , then find the equation of the other tangent to the circle from the origin.

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**269.** Find the number of common tangent to the circles $x^2 + y^2 + 2x + 8y - 23 = 0$ and $x^2 + y^2 - 4x - 10y + 9 = 0$

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**270.** Two variable chords $ABandBC$ of a circle $x^2 + y^2 = r^2$ are such that $AB = BC = r$ . Find the locus of the point of intersection of tangents at $AandC$.

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**271.** Find the equation of the chord of the circle $x^2 + y^2 = 9$ whose middle point is $(1, -2)$

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**272.** Find the circle of minimum radius which passes through the point (4, 3) and touches the circle $x^2 + y^2 = 4$ externally.

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**273.** A variable chord is drawn through the origin to the circle $x^2 + y^2 - 2ax = 0$ . Find the locus of the center of the circle drawn on this chord as diameter.

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**274.** The radius of the tangent circle that can be drawn to pass through the point (0, 1) and (0, 6) and touching the x-axis is(a) 5/2 (b)Â  3/2 (c) 7/2 (d) 9/2

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**275.** Find the equation of the chord of the circle $x^2 + y^2 = a^2$ passing through the point (2, 3) farthest from the center.

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**276.** The lines $2x - 3y = 5$ and $3x - 4y = 7$ are the diameters of a circle of area 154 sq. units. Then the equation of the circle is (a) $x^2 + y^2 + 2x - 2y = 62$ (b) $x^2 + y^2 + 2x - 2y = 47$ (c) $x^2 + y^2 - 2x + 2y = 47$ (d) $x^2 + y^2 - 2x + 2y = 62$

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**277.** Find the middle point of the chord of the circle $x^2 + y^2 = 25$ intercepted on the line $x - 2y = 2$

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**278.** Find the area of the triangle formed by the tangents from the point (4, 3) to the circle $x^2 + y^2 = 9$ and the line joining their points of contact.

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**279.** Find the equation of a circle with center (4, 3) touching the circle $x^2 + y^2 = 1$

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**280.** Find the equation of the tangent to the circle $x^2 + y^2 - 2ax - 2ay + a^2 = 0$ which makes with the coordinate axes a triangle of area $a^2$.

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**281.** Find the condition if the circle whose equations are $x^2 + y^2 + c^2 = 2ax$ and $x^2 + y^2 + c^2 - 2by = 0$ touch one another externally.

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**282.** Through a fixed point (h, k) secants are drawn to the circle $x^2+y^2=r^2$. Then the locus of the mid-points of the secants by the circle is

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**283.** A variable chord of the circle $x^2+y^2=4$ is drawn from the point $P(3, 5)$ meeting the circle at the point $A$ and $B$. A point $Q$ is taken on the chord such that $2PQ=PA+PB$. The locus of $Q$ is (a) $x^2+y^2+3x+4y=0$ (b)$x^2+y^2=36$ (c) $x^2+y^2=16$ (d) $x^2+y^2-3x-5y=0$

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**284.** In triangle $ABC$, the equation of side $BC$ is $x-y=0$. The circumcenter and orthocentre of triangle are (2, 3) and (5, 8), respectively. The equation of the circumcirle of the triangle is

A. a. $x^2 + y^2 - 4x + 6y - 27 = 0$

B. b. $x^2 + y^2 - 4x - 6y - 27 = 0$

C. c. $x^2 + y^2 + 4x + 6y - 27 = 0$

D. d.$x^2 + y^2 + 4x + 6y - 27 = 0$

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**285.** Let $a and b$ represent the lengths of a right triangles legs. If $d$ is the diameter of a circle inscribed into the triangle, and $D$ is the diameter of a circle circumscribed on the triangle, the $d + D$ equals. (a)$a + b$ (b) $2(a + b)$ (c)$\frac{1}{2}(a + b)$ (d) $\sqrt{a^2 + b^2}$

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**286.** If the chord $y = mx + 1$ of the circles $x^2 + y^2 = 1$ subtends an angle of $45^0$ at the major segment of the circle, then the value of $m$ is

A. (a)2

B. (b) -2

C. (c) -1

D. (d) none of these

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**287.** Solve the equation $2x^3 + 11x^2 - 9x - 18 = 0$

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**288.** If $O$ is the origin and $OPandOQ$ are the tangents from the origin to the circle $x^2 + y^2 - 6x + 4y + 8 = 0$ , then the circumcenter of triangle $OPQ$ is $(3, -2)$ (b) $\left(\frac{3}{2}, -1\right)$ (c) $\left(\frac{3}{4}, -\frac{1}{2}\right)$ (d) $\left(-\frac{3}{2}, 1\right)$

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**289.** The range of values of r for which the point $\left(-5+\frac{r}{\sqrt{2}},\ -3+\frac{r}{\sqrt{2}}\right)$ is an interior point of the major segment of the circle $x^2+y^2=16$, cut-off by the line $x+y=2$, is:

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**290.** A square is inscribed in the circle $x^2+y^2-2x+4y-93=0$ with its sides parallel to the coordinate axes. The coordinates of its vertices are

$(-6,\ -9), (-6, 5), (8,\ -9), (8, 5)$ $(-6,\ -9), (-6,\ -5), (8,\ -9), (8, 5)$

$(-6,\ -9), (-6, 5), (8, 9), (8, 5)$ $(-6,\ -9), (-6, 5), (8,\ -9), (8,\ -5)$

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**291.** Statement 1 : The least and greatest distances of the point $P(10, 7)$ from the circle $x^2+y^2-4x-2y-20=0$ are 5 units and 15 units, respectively. Statement 2 : A point $\left(x_1, y_1\right)$ lies outside the circle

$S = x^2 + y^2 + 2gx + 2fy + c = 0$ if $S_1 > 0$, where $S_1 = x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c$.

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**292.** Statement 1 : The number of circles passing through (1, 2), (4, 8) and (0, 0) is one. Statement 2 : Every triangle has one circumcircle

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**293.** The locus of the midpoint of a line segment that is drawn from a given external point $P$ to a given circle with center $O$ (where $O$ is the orgin) and radius $r$ is (a)a straight line perpendiculat to $PO$ (b)a circle with center $P$ and radius $r$ (c)a circle with center $P$ and radius $2r$ (d)a circle with center at the midpoint $PO$ and radius $\frac{r \cdot}{2}$

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**294.** The difference between the radii of the largest and smallest circles which have their centres on the circumference of the circle $x^2 + y^2 + 2x + 4y - 4 = 0$ and passes through point (a,b) lying outside the circle is :

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**295.** The center(s) of the circle(s) passing through the points (0, 0) and (1, 0) and touching the circle $x^2 + y^2 = 9$ is (are)

A. (a) $\left(\frac{3}{2}, \frac{1}{2}\right)$

B. (b) $\left(\frac{1}{2}, \frac{3}{2}\right)$

C. (c) $\left(\frac{1}{2}, 2^{\frac{1}{2}}\right)$

D. (d) $\left(\frac{1}{2}, -2^{\frac{1}{2}}\right)$

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**296.** Statement 1 : If the chords of contact of tangents from three points $A, BandC$ to the circle $x^2 + y^2 = a^2$ are concurrent, then $A, BandC$ will be collinear. Statement 2 : Lines $\left(a_1x + b_1y + c_1\right) + k\left(a_2x + b_2y + c_2\right) = 0$ alwasy pass through a fixed point for $k \in R$.

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**297.** Statement 1 : Circles $x^2 + y^2 = 144$ and $x^2 + y^2 - 6x - 8y = 0$ do not have any common tangent. Statement 2 : If two circles are concentric, then they do not hav common tangents.

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**298.** The locus of the point from which the lengths of the tangents to the circles $x^2 + y^2 = 4$ and $2\left(x^2 + y^2\right) - 10x + 3y - 2 = 0$ are equal is (a)a straight line inclined at $\frac{\pi}{4}$ with the line joining the centers of the circles (b)a circle (c) an ellipse (d)a straight line perpendicular to the line joining the centers of the circles.

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**299.** The locus of the center of the circle touching the line $2x - y = 1$ at $(1, 1)$ is (a)$x + 3y = 2$ (b) $x + 2y = 3$ (c)$x + y = 2$ (d) none of these

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**300.** The distance from the center of the circle $x^2 + y^2 = 2x$ to the common chord of the circles $x^2 + y^2 + 5x - 8y + 1 = 0$ and $x^2 + y^2 - 3x + 7y - 25 = 0$ is (a)2 (b) 4 (c) $\frac{34}{13}$ (d) $\frac{26}{17}$

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**301.** The circle passing through the point $( - 1, 0)$ and touching the y-axis at (0,2) also passes through the point.

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**302.** The equation of the circumcircle of an equilateral triangle is $x^2 + y^2 + 2gx + 2fy + c = 0$ and one vertex of the triangle in (1, 1). The equation of the incircle of the triangle is (a) $4\left(x^2 + y^2\right) = g^2 + f^2$ (b) $4\left(x^2 + y^2\right) = 8gx + 8fy = (1 - g)(1 + 3g) + (1 - f)(1 + 3f)$ (c) $4\left(x^2 + y^2\right) = 8gx + 8fy = g^2 + f^2$ (d) none of these

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**303.** A circle with radius $|a|$ and center on the y-axis slied along it and a variable line through (a, 0) cuts the circle at points $PandQ$ . The region in which the point of intersection of the tangents to the circle at points $P$ and $Q$ lies is represented by (a)$y^2 \geq 4\left(ax - a^2\right)$ (b) $y^2 \leq 4\left(ax - a^2\right)$ (c) $y \geq 4\left(ax - a^2\right)$ (d) $y \leq 4\left(ax - a^2\right)$

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**304.** If the angle of intersection of the circle $x^2 + y^2 + x + y = 0$ and $x^2 + y^2 + x - y = 0$ is $\theta$ , then the equation of the line passing through (1, 2) and making an angle $\theta$ with the y-axis is (a)$x = 1$ (b) $y = 2$ (c)$x + y = 3$ (d) $x - y = 3$

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**305.** The range of values of $\alpha$ for which the line $2y = gx + \alpha$ is a normal to the circle $x^2 = y^2 + 2gx + 2gy - 2 = 0$ for all values of $g$ is (a)$[1, \infty)$ (b) $[ - 1, \infty)$ (c)$(0, 1)$ (d) $( - \infty, 1]$

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**306.** ) Six points(x,yi),i=1,2, ,.., 6 are taken on the circle x4 such that the circle x2 + y 4 such that 6 6 J:1-8 and Σ, 4 . The line segment X,=8 and and 2-yi = 4. The line segment x1 i=1 joining orthocentre of a triangle formed by any three points and centroid of a triangle formed by other three points passes through a fixed i=1 points (h,k), then h+k is A) 1 B) 2 C) 3 D) 4

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**307.** Consider a circle $x^2 + y^2 + ax + by + c = 0$ lying completely in the first quadrant. If $m_1 and m_2$ are the maximum and minimum values of $\frac{y}{x}$ for all ordered pairs $(x, y)$ on the circumference of the circle, then the value of $\left(m_1 + m_2\right)$ is

A. (a) $\frac{a^2 - 4c}{b^2 - 4c}$

B. (b) $\frac{2ab}{b^2 - 4c}$

C. (c) $\frac{2ab}{4c - b^2}$

D. (d) $\frac{2ab}{b^2 - 4ac}$

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**308.** The equation of the circle passing through the point of intersection of the circle $x^2 + y^2 = 4$ and the line $2x + y = 1$ and having minimum possible radius is

A. (a) $5x^2 + 5y^2 + 18x + 6y - 5 = 0$

B. (b) $5x^2 + 5y^2 + 9x + 8y - 15 = 0$

C. (c) $5x^2 + 5y^2 + 4x + 9y - 5 = 0$

D. (d)$5x^2 + 5y^2 - 4x - 2y - 18 = 0$

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**309.** The centers of a set of circles, each of radius 3, lie on the circle $x^2 + y^2 = 25$ . The locus of any point in the set is (a) $4 \leq x^2 + y^2 \leq 64$ (b) $x^2 + y^2 \leq 25$ (c)$x^2 + y^2 \geq 25$ (d) $3 \leq x^2 + y^2 \leq 9$

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**310.** The coordinates of two points $PandQ$ are $\left(x_1, y_1\right)and\left(x_2, y_2\right)andO$ is the origin. If the circles are described on $OPandOQ$ as diameters, then the length of their common chord is (a) $\frac{|x_1y_2 + x_2y_1|}{PQ}$ (b) $\frac{|x_1y_2 - x_2y_1|}{PQ}$ $\frac{|x_1x_2 + y_1y_2|}{PQ}$ (d) $\frac{|x_1x_2 - y_1y_2|}{PQ}$

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**311.** The area of the triangle formed by the positive x-axis with the normal and the tangent to the circle $x^2 + y^2 = 4$ at $(1, \sqrt{3})$ is

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**312.** If the circle $C_1 : x^2 + y^2 = 16$ intersects another circle $C_2$ of radius $5$ in such a manner that,the common chord is of maximum length and has a slope equal to $\frac{3}{4}$, then the co-ordinates of the centre of $C_2$ are:

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**313.** The line $x - y + 2 = 0$ touches the parabola $y^2 = 8x$ at the point

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**314.** Let $AB$ be a chord of the circle $x^2 + y^2 = r^2$ subtending a right angle at the center. Then the locus of the centroid of the $\Delta PAB$ as $P$ moves on the circle is (1) A parabola (2) A circle (3) An ellipse (4) A pair of straight lines

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**315.** Let $PQ$ and $RS$ be tangent at the extremities of the diameter $PR$ of a circle of radius $r$. If $PS$ and $RQ$ intersect at a point $X$ on the circumference of the circle, then prove that $2r = \sqrt{PQ \times RS}$.

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**316.** Find the coordinates of the point at which the circles $x^2 - y^2 - 4x - 2y + 4 = 0$ and $x^2 + y^2 - 12x - 8y + 36 = 0$ touch each other.

Also, find equations of common tangents touching the circles the distinct points.

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**317.** Let $AB$ be chord of contact of the point $(5, -5)$ w.r.t the circle $x^2 + y^2 = 5$. Then find the locus of the orthocentre of the triangle $PAB$, where $P$ is any point moving on the circle.

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**318.** Let $P$ be any moving point on the circle $x^2 + y^2 - 2x = 1$. $AB$ be the chord of contact of this point w.r.t. the circle $x^2 + y^2 - 2x = 0$. The locus of the circumcenter of triangle $CAB$($C$ being the center of the circle) is $2x^2 + 2y^2 - 4x + 1 = 0$ $x^2 + y^2 - 4x + 2 = 0$ $x^2 + y^2 - 4x + 1 = 0$ $2x^2 + 2y^2 - 4x + 3 = 0$

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**319.** If eight distinct points can be found on the curve $|x| + |y| = 1$ such that from eachpoint two mutually perpendicular tangents can be drawn to the circle $x^2 + y^2 = a^2$, then find the tange of $a$

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**320.** A circle of radius 5 units has diameter along the angle bisector of the lines $x + y = 2$ and $x - y = 2$. If the chord of contact from the origin makes an angle of $45^0$ with the positive direction of the x-axis, find the equation of the circle.

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**321.** A circle of radius 1 unit touches the positive x-axis and the positive y-axis at $AandB$ , respectively. A variable line passing through the origin intersects the circle at two points $DandE$ . If the area of triangle $DEB$ is maximum when the slope of the line is $m$, then find the value of $m^{-2}$

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**322.** The number of rational point(s) [a point (a, b) is called rational, if $a and b$ both are rational numbers] on the circumference of a circle having center $(\pi, e)$ is a)at most one b) at least two c)exactly two d) infinite

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**323.** AB is a diameter of a circle. CD is a chord parallel to AB and $2CD = AB$. The tangent at B meets the line AC produced at E then AE is equal to -

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**324.** Two parallel tangents to a given circle are cut by a third tangent at the point $R and Q$ . Show that the lines from $R and Q$ to the center of the circle are mutually perpendicular.

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**325.** If the equation of any two diagonals of a regular pentagon belongs to the family of lines $(1 + 2\lambda)y - (2 + \lambda)x + 1 - \lambda = 0$ and their lengths are $\sin 36^0$ , then the locus of the center of circle circumscribing the given pentagon (the triangles formed by these diagonals with the sides of pentagon have no side common) is (a) $x^2 + y^2 - 2x - 2y + 1 + \sin^2 72^0 = 0$ (b)$x^2 + y^2 - 2x - 2y + \cos^2 72^0 = 0$ (c)$x^2 + y^2 - 2x - 2y + 1 + \cos^2 72^0 = 0$ (d) $x^2 + y^2 - 2x - 2y + \sin^2 72^0 = 0$

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**326.** If $OAandOB$ are equal perpendicular chords of the circles $x^2 + y^2 - 2x + 4y = 0$ , then the equations of $OAandOB$ are, where $O$ is the origin.

A. a.$3x + y = 0$ and $3x - y = 0$

B. b.$3x + y = 0$ and $3y - x = 0$

C. c.$x + 3y = 0$ and $y - 3x = 0$

D. d.$x + y = 0$ and $x - y = 0$

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**327.** $ABCD$ is a square of unit area. A circle is tangent to two sides of $ABCD$ and passes through exactly one of its vertices. The radius of the circle is a)$2 - \sqrt{2}$ b) $\sqrt{2} - 1$ c)$1/2$ d) $\frac{1}{\sqrt{2}}$

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**328.** $BandC$ are fixed points having coordinates (3, 0) and $(-3, 0)$, respectively. If the vertical angle $BAC$ is $90^0$ , then the locus of the centroid of $ABC$ has equation. (a)$x^2 + y^2 = 1$ (b) $x^2 + y^2 = 2$ (c) $9\left(x^2 + y^2\right) = 1$ (d) $9\left(x^2 + y^2\right) = 4$

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**329.** A straight line with slope 2 and y-intercept 5 touches the circle $x^2 + y^2 + 16x + 12y + c = 0$ at a point $Q$ Then the coordinates of $Q$ are $( - 6, 11)$ (b) $( - 9, - 13)$ $( - 10, - 15)$ (d) $( - 6, - 7)$

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**330.** A pair of tangents is drawn to a unit circle with center at the origin and these tangents intersect at $A$ enclosing an angle of $60^0$ . The area enclosed by these tangents and the arc of the circle is `

A. a) $\frac{2}{\sqrt{3}} - \frac{\pi}{6}$

B. (b) $\sqrt{3} - \frac{\pi}{3}$

C. c) $\frac{\pi}{3} - \frac{\sqrt{3}}{6}$

D. (d) $\sqrt{3}\left(1 - \frac{\pi}{6}\right)$

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**331.** A line meets the coordinate axes at $A$ and $B$ . A circle is circumscribed about the triangle $OAB$ If $d_1 and d_2$ are distances of the tangents to the circle at the origin $O$ from the points $A and B$ , respectively, then the diameter of the circle is $\frac{2d_1 + d_2}{2}$ (b) $\frac{d_1 + 2d_2}{2}$ $d_1 + d_2$ (d) $\frac{d_1 d_2}{d_1 + d_2}$

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**332.** A circle of constant radius $a$ passes through the origin $O$ and cuts the axes of coordinates at points $P$ and $Q$ . Then the equation of the locus of the foot of perpendicular from $O$ to $PQ$ is (A) $\left(x^2 + y^2\right)\left(\frac{1}{x^2} + \frac{1}{y^2}\right) = 4a^2$ (B) $\left(x^2 + y^2\right)^2\left(\frac{1}{x^2} + \frac{1}{y^2}\right) = a^2$ (C) $\left(x^2 + y^2\right)^2\left(\frac{1}{x^2} + \frac{1}{y^2}\right) = 4a^2$ (D) $\left(x^2 + y^2\right)\left(\frac{1}{x^2} + \frac{1}{y^2}\right) = a^2$

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**333.** The equation of the line inclined at an angle of $\frac{\pi}{4}$ to the x-axis ,such that the two circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 10x - 14y + 65 = 0$ intercept equal length on it, is (A) $2x - 2y - 3 = 0$ (B) $2x - 2y + 3 = 0$ (C) $x - y + 6 = 0$ (D) $x - y - 6 = 0$

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**334.** If a circle of constant radius $3k$ passes through the origin $O$ and meets the coordinate axes at $AandB$ , then the locus of the centroud of triangle $OAB$ is (a)$x^2 + y^2 = (2k)^2$ (b)$x^2 + y^2 = (3k)^2$ (c)$x^2 + y^2 = (4k)^2$ (d) $x^2 + y^2 = (6k)^2$

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**335.** A straight line $l_1$ with equation $x - 2y + 10 = 0$ meets the circle with equation $x^2 + y^2 = 100$ at $B$ in the first quadrant. A line through $B$ perpendicular to $l_1$ cuts the y-axis at $P(o, t)$ . The value of $t$ is 12 (b) 15 (c) 20 (d) 25

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**336.** Let $C$ be a circle with two diameters intersecting at an angle of $30^{0^{\cdot}}$ A circle $S$ is tangent to both the diameters and to $C$ and has radius unity. The largest radius of $C$ is (a)$1 + \sqrt{6} + \sqrt{2}$ (b) $1 + \sqrt{6} - \sqrt{2}$ (c)$\sqrt{6} + \sqrt{2} - 11$ (d) none of these

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**337.** If the circles $x^2 + y^2 + 2x + 2ky + 6 = 0$ and $x^2 + y^2 + 2ky + k = 0$ intersect orthogonally then k equals (A) $2 \text{ or } -\frac{3}{2}$ (B) $-2 \text{ or } -\frac{3}{2}$ (C) $2 \text{ or } \frac{3}{2}$ (D) $-2 \text{ or } \frac{3}{2}$

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**338.** An acute triangle PQR is inscribed in the circle $x^2 + y^2 = 25$. If Q and R have coordinates (3, 4) and (-4, 3) respectively, then find $\angle QPR$.

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**339.** A circle is given by $x^2 + (y - 1)^2 = 1$, another circle C touches it externally and also the x-axis, then the locus of center is:

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**340.** If one of the diameters of the circle $x^2 + y^2 - 2x - 6y + 6 \quad = 0$ is a chord to the circle with centre at $(2, 1)$ then the radius of the circle is equal to.

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**341.** 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

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**342.** If the tangent at the point on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the straight ine $5x - 2y + 6 = 0$ at a point Q on the y- axis then the length of PQ is

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**343.** Consider square $ABCD$ of side length 1. Let $P$ be the set of all segments of length 1 with endpoints on the adjacent sides of square $ABCD$ . The midpoints of segments in $P$ enclose a region with area $\dot{A}$ The value of $A$ is

A. (a) $\frac{\pi}{4}$

B. (b) $1 - \frac{\pi}{4}$

C. (c) $4 - \frac{\pi}{4}$

D. (d) none of these

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**344.** The number of intergral value of $y$ for which the chord of the circle $x^2 + y^2 = 125$ passing through the point $P(8, y)$ gets bisected at the point $P(8, y)$ and has integral slope is (a) 8 (b) 6 (c) 4 (d) 2

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**345.** Statement 1 : The circle having equation $x^2 + y^2 - 2x + 6y + 5 = 0$ intersects both the coordinate axes. Statement 2 : The lengths of $xandy$ intercepts made by the circle having equation $x^2 + y^2 + 2gx + 2fy + c = 0$ are $2\sqrt{g^2 - c}$ and $2\sqrt{f^2 - c}$, respectively.

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**346.** Statement 1 : The center of the circle having $x + y = 3$ and $x - y = 1$ as its normals is (1, 2) Statement 2 : The normals to the circle always pass through its center

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**347.** Statement 1 : The equations of the straight lines joining the origin to the points of intersection of $x^2 + y^2 - 4x - 2y = 4$ and $x^2 + y^2 - 2x - 4y - 4 = 0$ is $x - y = 0$ . Statement 2 : $y + x = 0$ is the common chord of $x^2 + y^2 - 4x - 2y = 4$ and $x^2 + y^2 - 2x - 4y - 4 = 0$

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**348.** Statement 1 : Points $A(1, 0), B(2, 3), C(5, 3), andD(6, 0)$ are concyclic. Statement 2 : Points $A, B, C, andD$ form an isosceles trapezium or $ABandCD$ meet at $\dot{E}$ Then $EA. EB = EC. \dot{ED}$

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**349.** The chords of contact of tangents from three points $A, BandC$ to the circle $x^2 + y^2 = a^2$ are concurrent. Then $A, BandC$ will be concyclic (b) be collinear form the vertices of a triangle none of these

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**350.** Statement 1 : The equation $x^2 + y^2 - 2x - 2ay - 8 = 0$ represents, for different values of $a$, a system of circles passing through two fixed points lying on the x-axis. Statement 2 : $S = 0$ is a circle and $L = 0$ is a straight line. Then $S + \lambda L = 0$ represents the family of circles passing through the points of intersection of the circle and the straight line (where $\lambda$ is an arbitrary parameter).

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**351.** The circles having radii $r_1 and r_2$ intersect orthogonally. The length of their common chord is `

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**352.** Tangents $PA$ and $PB$ are drawn to $x^2 + y^2 = 9$ from any arbitrary point $P$ on the line $x + y = 25$. The locus of the midpoint of chord $AB$ is `

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**353.** The two circles which pass through $(0, a) and (0, -a)$ and touch the line $y = mx + c$ will intersect each other at right angle if (A) $a^2 = c^2(2m + 1)$ (B) $a^2 = c^2\left(2 + m^2\right)$ (C) $c^2 = a^2\left(2 + m^2\right)$ (D) $c^2 = a^2(2m + 1)$

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**354.** If the pair of straight lines $xy\sqrt{3} - x^2 = 0$ is tangent to the circle at $P and Q$ from the origin $O$ such that the area of the smaller sector formed by $CP and CQ$ is $3\pi squnit$, where $C$ is the center of the circle, the $OP$ equals (a) $\frac{(3\sqrt{3})}{2}$ (b) $3\sqrt{3}$ (c) 3 (d) $\sqrt{3}$

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**355.** The locus of the midpoint of a chord of the circle $x^2 + y^2 = 4$ which subtends a right angle at the origins is (a) $x + y = 2$ (b) $x^2 + y^2 = 1$ (c)

$x^2 + y^2 = 2$ (d) $x + y = 1$

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**356.** The condition that the chord $x\cos\alpha + y\sin\alpha - p = 0$ of $x^2 + y^2 - a^2 = 0$ may subtend a right angle at the center of the circle is

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**357.** Let the base $AB$ of a triangle $ABC$ be fixed and the vertex $C$ lies on a fixed circle of radius $\dot{r}$ Lines through $AandB$ are drawn to intersect $CBandCA$, respectively, at $EandF$ such that $CE:EB = 1:2andCF:FA = 1:2$ . If the point of intersection $P$ of these lines lies on the median through $AB$ for all positions of $AB$, then the locus of $P$ is

A. a.a circle of radius $\frac{r}{2}$

B. b.a circle of radius $2r$

C. c.a parabola of latus rectum $4r$

D. d.a rectangular hyperbola

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**358.** If the chord of contact of tangents from a point $P$ to a given circle passes through $Q$, then the circle on $PQ$ as diameter.

A. a)cuts the given circle orthogonally

B. b)touches the given circle externally

C. c)touches the given circle internally

D. d)none of these

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**359.** Statement 1 : The chord of contact of the circle $x^2 + y^2 = 1$ w.r.t. the points (2, 3), (3, 5), and (1, 1) are concurrent. Statement 2 : Points (1, 1), (2, 3), and (3, 5) are collinear.

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**360.** Statement 1 : The number of circles touching lines $x + y = 1, 2x - y = 5,$ and $3x + 5y - 1 = 0$ is four Statement 2 : In any triangle, four circles can be drawn touching all the three sides of the triangle.

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**361.** The line $2x - y + 1 = 0$ is tangent to the circle at the point (2, 5) and the center of the circle lies on $x - 2y = 4.$ The radius of the circle is

A. (a)$3\sqrt{5}$

B. (b) $5\sqrt{3}$

C. (c) $2\sqrt{5}$

D. (d) $5\sqrt{2}$

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**362.** The equation of the chord of the circle $x^2 + y^2 - 3x - 4y - 4 = 0$ , which passes through the origin such that the origin divides it in the ratio 4:1, is

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**363.** A rhombus is inscribed in the region common to the two circles $x^2 + y^2 - 4x - 12 = 0$ and $x^2 + y^2 + 4x - 12 = 0$ with two of its vertices on the line joining the centers of the circles. The are of the rhombus is (A) $8\sqrt{3}$ sq.units (B) $4\sqrt{3}$ sq.units (C) $6\sqrt{3}$ sq.units (D) none of these

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**364.** In a triangle $ABC$, right angled at $A$, on the leg $AC$ as diameter, a semicircle is described. If a chord joins $A$ with the point of intersection $D$ of the hypotenuse and the semicircle, then the length of $AC$ is equal to (a) $\frac{AB.AD}{\sqrt{AB^2 + AD^2}}$ (b) $\frac{AB.AD}{AB + AD}$ (c) $\sqrt{AB.AD}$ (d) $\frac{AB.AD}{\sqrt{AB^2 - AD^2}}$

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**365.** Two congruent circles with centered at (2, 3) and (5, 6) which intersect at right angles, have radius equal to (a) $2\sqrt{3}$ (b) 3 (c) 4 (d) none of these

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**366.** The locus fo the center of the circles such that the point (2, 3) is the midpoint of the chord $5x + 2y = 16$ is (a) $2x - 5y + 11 = 0$ (b) $2x + 5y - 11 = 0$ (c) $2x + 5y + 11 = 0$ (d) none of these

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**367.** The value of 'c' for which the set $\left\{(x, y) \mid x^2 + y^2 + 2x \leq 1\right\} \cap \{(x, y) \mid x - y + c \leq 0\}$ contains only one point in common is

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**368.** A circle of radius unity is centered at thet origin. Two particles tart moving at the same time from the point $(1, 0)$ and move around the circle in opposite direction. One of the particle moves anticlockwise with constant speed $v$ and the other moves clockwise with constant speed $3v$. After leaving $(1, 0)$, the two particles meet first at a point $P$, and continue until they meet next at point $Q$. The coordinates of the point $Q$ are

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**369.** A circle is inscribed ti.e. touches all four sides ) into a rhombous ABCD with one angle 60Â°. The distance from the centre of the circle to the nearest vertex is equal to 1. If P is any point of the circle then $|PA|^2 + |PB|^2 + |PC|^2 + |PD|^2$ is equal to:

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**370.** Consider: $L_1 : 2x + 3y + p - 3 = 0$ $L_2 : 2x + 3y + p + 3 = 0$ where $p$ is a real number and $C : x^2 + y^2 + 6x - 10y + 30 = 0$ Statement 1 : If line $L_1$ is a chord of circle $C$, then line $L_2$ is not always a diameter of circle $\dot{C}$ Statement 2 : If line $L_1$ is a a diameter of circle $C$, then line $L_2$ is not a chord of circle $\dot{C}$ (A) Both the statement are True and Statement 2 is the correct explanation of Statement 1. (B) Both the statement are True but Statement 2 is not the correct explanation of Statement 1. (C) Statement 1 is True and Statement 2 is False. (D) Statement 1 is False and Statement 2 is True.

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**371.** The straight line 2x-3y = 1 divides the circular region $x^2 + y^2 \leq 6$ into two parts. If S = { $\left(2, \frac{3}{4}\right), \left(\frac{5}{2}, \frac{3}{4}\right), \left(\frac{1}{4}, -\frac{1}{4}\right), \left(\frac{1}{8}, \frac{1}{4}\right)$}, then the number of point(s) in S lying inside the smaller part is

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**372.** Let $ABCD$ be a quadrilateral with are $18$ , side $AB$ parallel to the side $CD, andAB = 2CD$ . Let $AD$ be perpendicular to $ABandCD$ . If a circle is drawn inside the quadrilateral $ABCD$ touching all the sides, then its radius is $3$ (b) 2 (c) $\frac{3}{2}$ (d) 1

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**373.** Consider a family of circles which are passing through the point $(-1, 1)$ and are tangent to the x-axis. If $(h, k)$ are the coordinates of the center of the circles, then the set of values of $k$ is given by the interval. (a) $k \geq \frac{1}{2}$ (b) $-\frac{1}{2} \leq k \leq \frac{1}{2}$ (c)$k \leq \frac{1}{2}$ (d) `0

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**374.** The range of values of $\lambda, \lambda > 0$ such that the angle $\theta$ between the pair of tangents drawn from $(\lambda, 0)$ to the circle $x^2 + y^2 = 4$ lies in $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$ is

(a) $\left(\frac{4}{\sqrt{3}}, \frac{2}{\sqrt{2}}\right)$ (b) $\left(0, \sqrt{2}\right)$ (c) $(1, 2)$ (d) none of these

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**375.** The equation of the incircle of equilateral triangle $ABC$ where $B \equiv (2, 0), C \equiv (4, 0)$, and $A$ lies in the fourth quadrant is: (a) $x^2 + y^2 - 6x + \frac{2y}{\sqrt{3}} + 9 = 0$ (b) $x^2 + y^2 - 6x - \frac{2y}{\sqrt{3}} + 9 = 0$ (c) $x^2 + y^2 + 6x + \frac{2y}{\sqrt{3}} + 9 = 0$ (d) none of these

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**376.** $f(x, y) = x^2 + y^2 + 2ax + 2by + c = 0$ represents a circle. If $f(x, 0) = 0$ has equal roots, each being 2, and $f(0, y) = 0$ has 2 and 3 as its roots, then the center of the circle is (a) $\left(2, \frac{5}{2}\right)$ (b) Data are not sufficient (c) $\left(-2, -\frac{5}{2}\right)$ (d) Data are inconsistent

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**377.** The area bounded by the curves $x^2 + y^2 = 1, x^2 + y^2 = 4$ and the pair of lines $\sqrt{3}x^2 + \sqrt{3}y^2 = 4xy$, in the first quadrant is (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{3}$

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**378.** The straight line $x\cos\theta + y\sin\theta = 2$ will touch the circle $x^2 + y^2 - 2x = 0$ if (a)$\theta = n\pi, n \in IQ$ (b) $A = (2n + 1)\pi, n \in I$ (c)$\theta = 2n\pi, n \in I$ (d) none of these

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**379.** The centre of a circle passing through (0,0), (1,0) and touching the Circle $x^2 + y^2 = 9$ is a. $\left(\frac{1}{2}, \sqrt{2}\right)$ b. $\left(\frac{1}{2}, \frac{3}{\sqrt{2}}\right)$ c. $\left(\frac{3}{2}, \frac{1}{\sqrt{2}}\right)$ d. $\left(\frac{1}{2}, -\frac{1}{\sqrt{2}}\right)$

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**380.** The locus of the centre of a circle which touches externally the circle $x^2 + y^2 - 6x - 6y + 14 = 0$ and also touches Y-axis, is given by the equation $(a)x^2 - 6x - 10y + 14 = 0$ (b) $x^2 - 10x - 6y + 14 = 0$(c)$y^2 + 6x - 10y + 14 - 0$ (d) $y^2 - 10x - 6y + 14 = 0$

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**381.** If the two circles $(x + 1)^2 + (y - 3) = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct point,then (A) $r > 2$ (B) $2 < r < 8$ (C) $r < 2$ (D) $r = 2$

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**382.** Two circles, each of radius 5 units, touch each other at (1, 2). If the equation of their common tangents is $4x + 3y = 10$, find the equations of the circles.

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**383.** If $5\tan\theta = 4$, then $\dfrac{5\sin\theta - 3\cos\theta}{5\sin\theta + 2\cos\theta}$ is equal to 0 (b) 1 (c) $\dfrac{1}{6}$ (d) 6

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**384.** The locus of the midpoints of the chords of contact of $x^2 + y^2 = 2$ from the points on the line $3x + 4y = 10$ is a circle with center $P$. If $O$ is the origin, then $OP$ is equal to 2 (b) 3 (c) $\dfrac{1}{2}$ (d) $\dfrac{1}{3}$

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**385.** A square is inscribed in the circle $x^2 + y^2 - 2x + 4y + 3 = 0$ . Its sides are parallel to the coordinate axes. One vertex of the square is (a) $\left(1 + \sqrt{2}, -2\right)$ (b) $\left(1 - \sqrt{2}, -2\right)$ (c) $\left(1, -2 + \sqrt{2}\right)$ (d) none of these

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**386.** Two circle $x^2 + y^2 = 6$ and $x^2 + y^2 - 6x + 8 = 0$ are given. Then the equation of the circle through their points of intersection and the point (1, 1) is (a) $x^2 + y^2 - 6x + 4 = 0$ (b)$x^2 + y^2 - 3x + 1 = 0$ (c) $x^2 + y^2 - 4y + 2 = 0$ (d)none of these

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**387.** The equation of the tangent to the circle $x^2 + y^2 = 25$ passing through $(-2, 11)$ is (a)$4x + 3y = 25$ (b) $3x + 4y = 38$ (c)$24x - 7y + 125 = 0$ (d) $7x + 24y = 250$

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**388.** If the area of the quadrilateral by the tangents from the origin to the circle $x^2 + y^2 + 6x - 10y + c = 0$ and the radii corresponding to the points of contact is $15,$ then a value of $c$ is (a)9 (b) 4 (c) 5 (d) 25

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**389.** If the circles $x^2 + y^2 - 9 = 0$ and $x^2 + y^2 + 2\alpha x + 2y + 1 = 0$ touch each other, then $\alpha$ is (a)-$\frac{4}{3}$ (b) 0 (c) 1 (d) $\frac{4}{3}$

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**390.** Point M moves on the circle $(x - 4)^2 + (y - 8)^2 = 20$. Then it brokes away from it and moving along a tangent to the circle, cuts the x-axis at the point (-2,0). The co-ordinates of a point on the circle at which the moving point broke away is

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**391.** The points on the line $x = 2$ from which the tangents drawn to the circle $x^2 + y^2 = 16$ are at right angles is (are) (a)$\left(2, 2\sqrt{7}\right)$ (b) $\left(2, 2\sqrt{5}\right)$ (c) $\left(2, -2\sqrt{7}\right)$ (d) $\left(2, -2\sqrt{5}\right)$

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**392.** Co-ordinates of the centre of a circle, whose radius is 2 unit and which touches the pair of lines ines $x^2 - y^2 - 2x + 1 = 0$ is (are)

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**393.** Three sided of a triangle have equations $L_1 \equiv y - m_i x = o; i = 1, 2and3.$ Then $L_1L_2 + \lambda L_2L_3 + \mu L_3L_1 = 0$ where $\lambda \neq 0, \mu \neq 0,$ is the equation of the circumcircle of the triangle if $1 + \lambda + \mu = m_1m_2 + \lambda m_2m_3 + \lambda m_3m_1$ $m_1(1 + \mu) + m_2(1 + \lambda) + m_3(\mu + \lambda) = 0$ $\frac{1}{m_3} + \frac{1}{m_1} + \frac{1}{m_1} = 1 + \lambda + \mu$ none of these

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**394.** If the equation $x^2 + y^2 + 2hxy + 2gx + 2fy + c = 0$ represents a circle, then the condition for that circle to pass through three quadrants only but not passing through the origin is (a)$f^2 > c$ (b) $g^2 > 2$ (c)$c > 0$ (d) $h = 0$

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**395.** Consider two circles $x^2 + y^2 - 4x - 6y - 8 = 0$ and $x^2 + y^2 - 2x - 3 = 0$ Statement 1 : Both the circles intersect each other at two distinct points. Statement 2 : The sum of radii of the two circles is greater than the distance between their centers.

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**396.** Statement-1: The point $(\sin\alpha, \cos\alpha)$ does not lie outside the parabola $y^2 + x - 2 = 0$ when $\alpha \in \left[\frac{\pi}{2}, \frac{5\pi}{6}\right] \cup \left[\pi, \frac{3\pi}{2}\right]$ Statement-2: The point $\left(x_1, y_1\right)$ lies outside the parabola $y^2 = 4ax$ if $y_1^2 - 4ax_1, 0$.

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**397.** The equation of the circle which touches the axes of coordinates and the line $\frac{x}{3} + \frac{y}{4} = 1$ and whose center lies in the first quadrant is $x^2 + y^2 - 2cx - 2cy + c^2 = 0$, where $c$ is (a) 1 (b) 2 (c) 3 (d) 6

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**398.** The equations of tangents to the circle $x^2 + y^2 - 6x - 6y + 9 = 0$ drawn from the origin in (a)$x = 0$ (b) $x = y$ (c) $y = 0$ (d) $x + y = 0$

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**399.** Statement 1 : Two orthogonal circles intersect to generate a common chord which subtends complimentary angles at their circumferences. Statement 2 : Two orthogonal circles intersect to generate a common chord which subtends supplementary angles at their centers.

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**400.** If a circle passes through the point $(a, b)$ and cuts the circle $x^2 + y^2 = k^2$ orthogonally, then the equation of the locus of its center is

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**401.** Difference in values of the radius of a circle whose center is at the origin and which touches the circle $x^2 + y^2 - 6x - 8y + 21 = 0$ is___________

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**402.** A triangle is inscribed in a circle of radius 1. The distance between the orthocentre and the circumcentre of the triangle cannot be

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**403.** 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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**404.** Let $2x^2 + y^2 - 3xy = 0$ be the equation of pair of tangents drawn from the origin to a circle of radius 3, with center in the first quadrant. If A is the point of contact. Find OA

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**405.** Find the equation of a circle which passes through the point $(2, 0)$ and whose centre is the limit of the point of intersection of eth lines $3x + 5y = 1, \text{ and } (2 + c)x + 5c^2y = 1, c \to 1.$

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**406.** Let $T_1, T_2$ and be two tangents drawn from (-2, 0) onto the circle $C: x^2 + y^2 = 1$. Determine the circles touching C and having $T_1, T_2$ as their pair of tangents. Further, find the equations of all possible common tangents to these circles when taken two at a time

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**407.** Let $C_1$ be the circle with center $O_1(0, 0)$ and radius 1 and $C_2$ be the circle with center $O_2\left(t, t^2 + 1\right), (t \in R)$, and radius 2. Statement 1 : Circles $C_1 and C_2$ always have at least one common tangent for any value of $t$ Statement 2 : For the two circles $O_1O_2 \geq \left|r_1 - r_2\right|$, where $r_1 and r_2$ are their radii for any value of $t$.

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**408.** From the point $P\left(\sqrt{2}, \sqrt{6}\right)$ , tangents $PA and PB$ are drawn to the circle $x^2 + y^2 = 4$ Statement 1 :The area of quadrilateral $OAPB(O$ being the origin) is 4. Statement 2 : The area of square is $a^2$, where $a$ is the length of side.

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**409.** $C_1$ is a circle of radius 1 touching the x- and the y-axis. $C_2$ is another circle of radius greater than 1 and touching the axes as well as the circle $C_1$ . Then the radius of $C_2$ is (a)$3 - 2\sqrt{2}$ (b) $3 + 2\sqrt{2}$ (c)$3 + 2\sqrt{3}$ (d) none of these

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**410.** There are two circles whose equation are $x^2 + y^2 = 9$ and $x^2 + y^2 - 8x - 6y + n^2 = 0, n \in \dot{Z}$ If the two circles have exactly two common tangents, then the number of possible values of $n$ is 2 (b) 8 (c) 9 (d) none of these

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**411.** The line $x + 3y = 0$ is a diameter of the circle $x^2 + y^2 - 6x + 2y = 0$

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**412.** No tangent can be drawn from the point $\left(\frac{5}{2}, 1\right)$ to the circumcircle of the triangle with vertices $\left(1, \sqrt{3}\right), \left(1, -\sqrt{3}\right), \left(3, -\sqrt{3}\right)$.

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**413.** A circle passes through the points $A(1, 0) and B(5, 0)$, and touches the y-axis at $C(0, h)$. If $\angle ACB$ is maximum, then

A. (a)$h = 3\sqrt{5}$

B. (b) $h = 2\sqrt{5}$

C. (c)$h = \sqrt{5}$

D. (d) $h = 2\sqrt{10}$

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**414.** The locus of a point which moves such that the sum of the square of its distance from three vertices of a triangle is constant is a/an

(a)circle (b) straight line (c) ellipse (d) none of these

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**415.** The equation of four circles are $(x \pm a)^2 + (y \pm a)^2 = a^2$ . The radius of a circle touching all the four circles is (a) $\left(\sqrt{2} + 2\right)a$ (b) $2\sqrt{2}a$ (c) $\left(\sqrt{2} + 1\right)a$ (d) $\left(2 + \sqrt{2}\right)a$

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**416.** An isosceles triangle $ABC$ is inscribed in a circle $x^2 + y^2 = a^2$ with the vertex $A$ at $(a, 0)$ and the base angle $BandC$ each equal $75^0$ . Then the coordinates of an endpoint of the base are. (a) $\left(-\frac{\sqrt{3}a}{2}, \frac{a}{2}\right)$ (b) $\left(-\frac{\sqrt{3}a}{2}, a\right)$ (c) $\left(\frac{a}{2}, \frac{\sqrt{3}a}{2}\right)$ (d) $\left(\frac{\sqrt{3}a}{2}, -\frac{a}{2}\right)$

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**417.** Find the area of the region bounded by the curve $y = x^2$ and the line y = 4.

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**418.** If $(\alpha, \beta)$ is a point on the circle whose center is on the x-axis and which touches the line $x + y = 0$ at $(2, -2)$, then the greatest value of $\alpha$ is (a)4 - $\sqrt{2}$ (b) 6 (c)4 $+ 2\sqrt{2}$ (d) $+\sqrt{2}$

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**419.** The area of the triangle formed by joining the origin to the point of intersection of the line $x\sqrt{5} + 2y = 3\sqrt{5}$ and the circle $x^2 + y^2 = 10$ is (a)3 (b) 4 (c) 5 (d) 6

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**420.** A circle with center $(a, b)$ passes through the origin. The equation of the tangent to the circle at the origin is (a)$ax - by = 0$ (b) $ax + by = 0$ (c) $bx - ay = 0$ (d) $bx + ay = 0$

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**421.** A particle from the point $P\left(\sqrt{3}, 1\right)$ moves on the circle $x^2 + y^2 = 4$ and after covering a quarter of the circle leaves it tangentially. The equation of a line along with the point moves after leaving the circle is

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**422.** The circles $x^2 + y^2 + 2x + 4y - 20 = 0$ and $x^2 + y^2 + 6x - 8y + 10 = 0$ a) are such that the number of common tangents on them is 2 b) are orthogonal c) are such that the length of their common tangents is $5\left(\frac{12}{5}\right)^{\frac{1}{4}}$ d) are such that the length of their common chord is $5\frac{\sqrt{3}}{2}$

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**423.** The equation of a circle of radius 1 touching the circles $x^2 + y^2 - 2|x| = 0$ is (a) $x^2 + y^2 + 2\sqrt{2}x + 1 = 0$ (b) $x^2 + y^2 - 2\sqrt{3}y + 2 = 0$ (c) $x^2 + y^2 + 2\sqrt{3}y + 2 = 0$ (d) $x^2 + y^2 - 2\sqrt{2} + 1 = 0$

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**424.** Which of the following lines have the intercepts of equal lengths on the circle, $x^2 + y^2 - 2x + 4y = 0$ (A) $3x - y = 0$ (B) $x + 3y = 0$(C) $x + 3y + 10 = 0$ (D) $3x - y - 10 = 0$

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**425.** If a circle passes through the point of intersection of the lines $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$ with the coordinate axis, then value of $\lambda$ is

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**426.** The circles $x^2 + y^2 - 2x - 4y + 1 = 0$ and $x^2 + y^2 + 4x + 4y - 1 = 0$ (a)touch internally (b)touch externally (c)have $3x + 4y - 1 = 0$ as the common tangent at the point of contact (d)have $3x + 4y + 1 = 0$ as the common tangent at the point of contact

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**427.** The equation of the line(s) parallel to $x - 2y = 1$ which touch(es) the circle $x^2 + y^2 - 4x - 2y - 15 = 0$ is (are) (a)$x - 2y + 2 = 0$ (b) $x - 2y - 10 = 0$ (c) $x - 2y - 5 = 0$ (d) $3x - y - 10 = 0$

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**428.** If the conics whose equations are

$S_1 : \left(\sin^2\theta\right)x^2 + (2h\tan\theta)xy + \left(\cos^2\theta\right)y^2 + 32x + 16y + 19 = 0$

$S_2 : \left(\cos^2\theta\right)x^2 - \left(2h'\cot\theta\right)xy + \left(\sin^2\theta\right)y^2 + 16x + 32y + 19 = 0$ intersect at four concyclic points, where $\theta\left[0, \frac{\pi}{2}\right]$, then the correct statement(s) can be (a)$h + h' = 0$ (b) $h - h' = 0$ (c)$\theta = \frac{\pi}{4}$ (d) none of these

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**429.** From the point A (0, 3) on the circle $x^2 + 4x + (y - 3)^2 = 0$ a chord AB is drawn & extended to a M point such that AM=2AB. The equation of the locus of M is: (A)$x^2 + 8x + y^2 = 0$ (B)$x^2 + 8x + (y - 3)^2 = 0$ (C) $(x - 3)^2 + 8x + y^2 = 0$ (D)$x^2 + 8x + 8y = 0$

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**430.** Tangents are drawn from external point $P(6, 8)$ to the circle $x^2 + y^2 = r^2$ find the radius r of the circle such that area of triangle formed by the tangents and chord of contact is maximum is (A) 25 (B) 15 (C) 5 (D) none of these

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**431.** The radius of the of circle touching the line $2x + 3y + 1 = 0$ at (1,-1) and cutting orthogonally the circle having line segment joining (0, 3) and

(-2,-1) as diameter is

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**432.** If the abscissa and ordinates of two points $PandQ$ are the roots of the equations $x^2 + 2ax - b^2 = 0$ and $x^2 + 2px - q^2 = 0$ , respectively, then find the equation of the circle with $PQ$ as diameter.

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**433.** Line segments $AC$ and $BD$ are diameters of the circle of radius one. If $\angle BDC = 60^0$ , the length of line segment $AB$ is________

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**434.** three circles which have the same radius r, have centres at $(0, 0); (1, 1)$ and $(2, 1)$. If they have a common tangent line, as shown then, their radius 'r' is -

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**435.** The acute angle between the line $3x - 4y = 5$ and the circle $x^2 + y^2 - 4x + 2y - 4 = 0$ is $\theta$. Then $9\cos\theta =$

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**436.** If two perpendicular tangents can be drawn from the origin to the circle $x^2 - 6x + y^2 - 2py + 17 = 0$, then the value of $|p|$ is___

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**437.** Let $A(-4, 0), B(4, 0)$ Number of points $c = (x, y)$ on circle $x^2 + y^2 = 16$ such that area of triangle whose verties are A,B,C is positive integer is:

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**438.** If the circle $x^2 + y^2 + (3 + \sin\beta)x + 2\cos\alpha y = 0$ and $x^2 + y^2 + 2\cos\alpha x + 2cy = 0$ touch each other, then the maximum value of c is

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**439.** A tangent at a point on the circle $x^2 + y^2 = a^2$ intersects a concentric circle $C$ at two points $PandQ$ . The tangents to the circle $X$ at $PandQ$ meet at a point on the circle $x^2 + y^2 = b^2$. Then the equation of the circle is

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

B. b. $x^2 + y^2 = (a - b)^2$

C. c. $x^2 + y^2 = (a + b)^2$

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

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**440.** Tangent are drawn to the circle $x^2 + y^2 = 1$ at the points where it is met by the circles $x^2 + y^2 - (\lambda + 6)x + (8 - 2\lambda)y - 3 = 0$, $\lambda$ being the variable. The locus of the point of intersection of these tangents is

A. $a)2x - y + 10 = 0$

B. (b) $2x + y - 10 = 0$

C. c)$x - 2y + 10 = 0$

D. (d) $2x + y - 10 = 0$

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**441.** From the points (3, 4), chords are drawn to the circle $x^2 + y^2 - 4x = 0$ . The locus of the midpoints of the chords is (a) $x^2 + y^2 - 5x - 4y + 6 = 0$ (b) $x^2 + y^2 + 5x - 4y + 6 = 0$ (c)$x^2 + y^2 - 5x + 4y + 6 = 0$ (d) $x^2 + y^2 - 5x - 4y - 6 = 0$

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**442.** The angles at which the circles $(x - 1)^2 + y^2 = 10 and x^2 + (y - 2)^2 = 5$ intersect is $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

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**443.** Two circles of radii 4cm and 1cm touch each other externally and $\theta$ is the angle contained by their direct common tangents. Then $\sin\theta$ is equal to (a) $\frac{24}{25}$ (b) $\frac{12}{25}$ (c) $\frac{3}{4}$ (d) none of these

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**444.** The locus of the midpoints of the chords of the circle $x^2 + y^2 - ax - by = 0$ which subtend a right angle at $\left(\frac{a}{2}, \frac{b}{2}\right)$ is (a) $ax + by = 0$ (b) $ax + by = a^2 = b^2$ (c) $x^2 + y^2 - ax - by + \frac{a^2 + b^2}{8} = 0$ (d) $x^2 + y^2 - ax - by - \frac{a^2 + b^2}{8} = 0$

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**445.** A is a point (a, b) in the first quadrant. If the two circles which passes through A and touches the coordinate axes cut at right angles then :

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**446.** Find the number of common tangent to the circles $x^2 + y^2 + 2x + 8y - 23 = 0$ and $x^2 + y^2 - 4x - 10y + 9 = 0$

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**447.** If the tangents are drawn from any point on the line $x + y = 3$ to the circle $x^2 + y^2 = 9$ , then the chord of contact passes through the point. a) (3, 5) (b) (3, 3) (c) (5, 3) (d) none of these

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**448.** If the radius of the circumcircle of the triangle TPQ, where PQ is chord of contact corresponding to point T with respect to circle $x^2 + y^2 - 2x + 4y - 11 = 0$, is 6 units, then minimum distances of T from the director circle of the given circle is

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**449.** If the radius of the circumcircle of the triangle TPQ, where PQ is chord of contact corresponding to point T with respect to circle $x^2 + y^2 - 2x + 4y - 11 = 0$, is 6 units, then minimum distances of T from the director circle of the given circle is

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**450.** The equation of the locus of the middle point of a chord of the circle $x^2 + y^2 = 2(x + y)$ such that the pair of lines joining the origin to the point of intersection of the chord and the circle are equally inclined to the x-axis is $x + y = 2$ (b) $x - y = 2$ $2x - y = 1$ (d) none of these

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**451.** Two circles $C_1 and C_2$ intersect at two distinct points $P and Q$ in a line passing through $P$ meets circles $C_1 and C_2$ at $A and B$, respectively. Let $Y$ be the midpoint of $AB, and QY$ meets circles $C_1 and C_2$ at $X and Z$, respectively. Then prove that $Y$ is the midpoint of $XZ^{\cdot}$

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**452.** The two points $A$ and $B$ in a plane are such that for all points $P$ lies on circle satisfied $P\frac{A}{P}B = k$, then $k$ will not be equal to

A. a.0

B. b.1

C. c.2

D. d. none of these

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**453.** The points of intersection of the line $4x - 3y - 10 = 0$ and the circle $x^2 + y^2 - 2x + 4y - 20 = 0$ are _______ and _______

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**454.** If the lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ are tangents to a circle, then find the radius of the circle.

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**455.** find the area of the quadrilateral formed by a pair of tangents from the point (4,5) to the circle $x^2 + y^2 - 4x - 2y - 11 = 0$ and pair of its radii.

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**456.** From the origin, chords are drawn to the circle $(x - 1)^2 + y^2 = 1$. The equation of the locus of the mid-points of these chords is circle with radius

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**457.** If the radii of the circle $(x - 1)^2 + (y - 2)^2 = 1$ and $(x - 7)^2 + (y - 10)^2 = 4$ are increasing uniformly w.r.t. times as 0.3 unit/s is and 0.4 unit/s, then they will touch each other at $t$ equal to (a)$45s$ (b) $90s$ (c) $11s$ (d) $135s$

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**458.** The equation of the circle which has normals $(x - 1).(y - 2) = 0$ and a tangent $3x + 4y = 6$ is (a) $x^2 + y^2 - 2x - 4y + 4 = 0$ (b) $x^2 + y^2 - 2x - 4y + 5 = 0$ (c) $x^2 + y^2 = 5$ (d) $(x - 3)^2 + (y - 4)^2 = 5$

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**459.** A wheel of radius 8 units rolls along the diameter of a semicircle of radius 25 units; it bumps into this semicircle. What is the length of the portion of the diameter that cannot be touched by the wheel? (a)12

(b) 15 (c) 17 (d) 20

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**460.** The point ([p+1],[p]) is lying inside the circle $x^2 + y^2 - 2x - 15 = 0$ . Then the set of all values of $p$ is (where [.] represents the greatest integer function) (a)$[-2, 3)$ (b) $(-2, 3)$ (c)$[-2, 0) \cup (0, 3)$ (d) $[0, 3)$

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**461.** The squared length of the intercept made by the line $x = h$ on the pair of tangents drawn from the origin to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is

A. a. $\frac{4ch^2}{\left(g^2 - c\right)^2}\left(g^2 + f^2 - c\right)$

B. b. $\dfrac{4ch^2}{\left(f^2 - c\right)^2}\left(g^2 + f^2 - c\right)$

C. c. $\dfrac{4ch^2}{\left(f^2 - f^2\right)^2}\left(g^2 + f^2 - c\right)$

D. (d) none of these

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**462.** Two parallel tangents to a given circle are cut by a third tangent at the points $AandB$. If $C$ is the center of the given circle, then $\angle ACB$ (a)depends on the radius of the circle. (b)depends on the center of the circle. (c)depends on the slopes of three tangents. (d)is always constant

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**463.** Three equal circles each of radius $r$ touch one another. The radius of the circle touching all the three given circles internally is (a) $\left(2 + \sqrt{3}\right)r$ (b)

$\frac{(2+\sqrt{3})}{\sqrt{3}}r$ (c) $\frac{(2-\sqrt{3})}{\sqrt{3}}r$ (d) $(2-\sqrt{3})r$

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**464.** If (m_i,1/m_i),i=1,2,3,4 are concyclic points then the value of $m_1m_2m_3m_4$ is

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**465.** The equation of the locus of the mid-points of chords of the circle $4x^2+4y^2-12x+4y+1=0$ that subtends an angle of at its centre is $\frac{2\pi}{3}$ at its centre is $x^2+y^2-kx+y+\frac{31}{16}=0$ then k is

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**466.** The chords of contact of the pair of tangents drawn from each point on the line $2x+y=4$ to the circle $x^2+y^2=1$ pass through the point (a,b) then 4(a+b) is

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**467.** Let $S \equiv x^2 + y^2 + 2gx + 2fy + c =$ be a given circle. Find the locus of the foot of the perpendicular drawn from the origin upon any chord of S which subtends a right angle at the origin.

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**468.** The circle $x^2 + y^2 - 4x - 4y + 4 = 0$ is inscribed in a triangle which has two of its sides along the coordinate axes. The locus of the circumcenter of the triangle is $x + y - xy + k\left(x^2 + y^2\right)^{\frac{1}{2}} = 0$. Find $k$.

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**469.** Let a given line $L_1$ intersect the X and Y axes at P and Q respectively. Let another line $L_2$ perpendicular to $L_1$ cut the X and Y-axes at Rand S, respectively. Show that the locus of the point of intersection of the line PS and QR is a circle passing through the origin

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**470.** Lines $5x + 12y - 10 = 0$ and $5x - 12y - 40 = 0$ touch a circle C1 of diameter 6. If the centre of C1, lies in the first quadrant then the equation of the circle C2, which is concentric with C1, and cuts intercepts of length 8 on these lines is

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**471.** From a point $R(5, 8)$ , two tangents $RPandRQ$ are drawn to a given circle $S = 0$ whose radius is 5. If the circumcenter of triangle $PQR$ is (2, 3), then the equation of the circle $S = 0$ is (a)$x^2 + y^2 + 2x + 4y - 20 = 0$ (b) $x^2 + y^2 + x + 2y - 10 = 0$ (c) $x^2 + y^2 - x + 2y - 20 = 0$ (d ) $x^2 + y^2 + 4x - 6y - 12 = 0$

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**472.** . Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ Suppose that the tangents at the points B(1,7) and D(4,-2) on the circle meet at the point C. Find the area of the quadrilateral ABCD

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**473.** If $r_1 and r_2$ are the radii of the smallest and the largest circles, respectively, which pass though (5, 6) and touch the circle $(x - 2)^2 + y^2 = 4$, then $r_1 r_2$ is (a)$\frac{4}{41}$ (b) $\frac{41}{4}$ (c)$\frac{5}{41}$ (d) $\frac{41}{6}$

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**474.** From an arbitrary point $P$ on the circle $x^2 + y^2 = 9$ , tangents are drawn to the circle $x^2 + y^2 = 1$ , which meet $x^2 + y^2 = 9$ at $A and B$ . The locus of the point of intersection of tangents at $A and B$ to the circle $x^2 + y^2 = 9$ is $x^2 + y^2 = \left(\frac{27}{7}\right)^2$ (b) $x^2 - y^2\left(\frac{27}{7}\right)^2$ $y^2 - x^2 = \left(\frac{27}{7}\right)^2$ (d) none of these

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**475.** If $C_1 : x^2 + y^2 = \left(3 + 2\sqrt{2}\right)^2$ is a circle and $PA$ and $PB$ are a pair of tangents on $C_1$, where $P$ is any point on the director circle of $C_1$, then the radius of the smallest circle which touches $c_1$ externally and also the two tangents $PA$ and $PB$ is $2\sqrt{3} - 3$ (b) $2\sqrt{2} - 1$ $2\sqrt{2} - 1$ (d) 1

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**476.** The minimum radius of the circle which is orthogonal with both the circles $x^2 + y^2 - 12x + 35 = 0$ and $x^2 + y^2 + 4x + 3 = 0$ is (a) 4 (b) 3 (c) $\sqrt{15}$ (d) 1

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**477.** If a circle of radius $r$ is touching the lines $x^2 - 4xy + y^2 = 0$ in the first quadrant at points $AandB$ , then the area of triangle $OAB(O$ being the origin) is (a)$3\sqrt{3}\frac{r^2}{4}$ (b) $\frac{\sqrt{3}r^2}{4}$ (c)$\frac{3r^2}{4}$ (d) $r^2$

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**478.** Suppose $ax + by + c = 0$ , where $a, bandc$ are in $AP$ be normal to a family of circles. The equation of the circle of the family intersecting the circle $x^2 + y^2 - 4x - 4y - 1 = 0$ orthogonally is (a)$x^2 + y^2 - 2x + 4y - 3 = 0$ (b) $x^2 + y^2 - 2x + 4y + 3 = 0$ (c)$x^2 + y^2 + 2x + 4y + 3 = 0$ (d) $x^2 + y^2 + 2x - 4y + 3 = 0$

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**479.** Two circles of radii $aandb$ touching each other externally, are inscribed in the area bounded by $y = \sqrt{1 - x^2}$ and the x-axis. If $b = \frac{1}{2}$, then $a$ is equal to (a)$\frac{1}{4}$ (b) $\frac{1}{8}$ (c) $\frac{1}{2}$ (d) $\frac{1}{\sqrt{2}}$

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**480.** Let $P$ be any moving point on the circle $x^2 + y^2 - 2x = 1$. $AB$ be the chord of contact of this point w.r.t. the circle $x^2 + y^2 - 2x = 0$ . The locus of the circumcenter of triangle $CAB(C$ being the center of the circle) is

$2x^2 + 2y^2 - 4x + 1 = 0$ $x^2 + y^2 - 4x + 2 = 0$ $x^2 + y^2 - 4x + 1 = 0$

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

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**481.** C1 and C2 are two concentric circles, the radius of C2 being twice that of C1. From a point P on C2, tangents PA and PB are drawn to C1. Then the centroid of the triangle PAB (a) lies on C1 (b) lies outside C1 (c) lies inside C1 (d) may lie inside or outside C1 but never on C1

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**482.** Let $C$ be any circle with centre $\left(0, \sqrt{2}\right)^{\cdot}$ Prove that at most two rational points can be there on $\dot{C}$ (A rational point is a point both of whose coordinates are rational numbers)

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**483.** Consider a curve $ax^2 + 2hxy + by^2 = 1$ and a point P not on the curve. A line drawn from the point P intersect the curve at points Q and R. If he product $PQ. PR$ is (A) a pair of straight line (B) a circle (C) a parabola (D) an ellipse or hyperbola

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**484.** Consider a family of circles passing through the points (3, 7) and (6,5). Answer the following questions. Number of circles which belong to the family and also touchingx- axis are

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**485.** Let $x and y$ be real variables satisfying $x^2 + y^2 + 8x - 10y - 40 = 0$. Let $a = \max\left\{\sqrt{(x+2)^2 + (y-3)^2}\right\}$ and $b = \min\left\{\sqrt{(x+2)^2 + (y-3)^2}\right\}$.

Then

A. (a)$a + b = 18$

B. (b) $a + b = \sqrt{2}$

C. (c)$a - b = 4\sqrt{2}$

D. (d) $a\dot{b} = 73$

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**486.** $A\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ is a point on the circle $x^2 + y^2 = 1$ and $B$ is another point on the circle such that are length $AB = \frac{\pi}{2}$ units. Then, the coordinates of $B$ can be

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

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

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

D. (d) none of these

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**487.** Tangent drawn from the point $(a, 3)$ to the circle $2x^2 + 2y^2 = 25$ will be perpendicular to each other if $a$ equals a)5 (b) -4 (c) 4 (d) -5

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**488.** Consider the circle $x^2 + y^2 - 10x - 6y + 30 = 0$. Let O be the centre of the circle and tangent at A(7,3) and B(5, 1) meet at C. Let S=0 represents family of circles passing through A and B, then

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**489.** If the circle $x^2 + y^2 + 2a_1x + c = 0$ lies completely inside the circle $x^2 + y^2 + 2a_2x + c = 0$ then

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**490.** Let $ABC$ be a triangle right-angled at $AandS$ be its circumcircle. Let $S_1$ be the circle touching the lines $AB$ and $AC$ and the circle $S$ internally. Further, let $S_2$ be the circle touching the lines $AB$ and $AC$ produced and the circle $S$ externally. If $r_1$ and $r_2$ are the radii of the circles $S_1$ and $S_2$ , respectively, show that $r_1r_2 = 4$ area $(ABC)$

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**491.** ABCD is a rectangle. A circle passing through vertex C touches the sides AB and AD at M and N respectively. If the distance lof the line MN from the vertex C is P units then the area of rectangle ABCD is

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**492.** If the length of the common chord of two circles $x^2 + y^2 + 8x + 1 = 0$ and $x^2 + y^2 + 2\mu y - 1 = 0$ is $2\sqrt{6}$, then the values of $\mu$ are (a)$\pm 2$ (b) $\pm 3$ (c) $\pm 4$ (d) none of these

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**493.** The locus of the midpoint of a chord of the circle $x^2 + y^2 = 4$ which subtends a right angle at the origins is (a)$x + y = 2$ (b) $x^2 + y^2 = 1$ (c) $x^2 + y^2 = 2$ (d) $x + y = 1$

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**494.** Tangents are drawn from the point (17, 7) to the circle $x^2 + y^2 = 169$, Statement I The tangents are mutually perpendicular Statement, lls The locus of the points frorn which mutually perpendicular tangents can be drawn to the given circle is $x^2 + y^2 = 338$ (a) Statement I is correct, Statement II is correct; Statement II is a correct explanation for

Statementl (b)Statement I is correct, Statement I| is correct Statement II is not a correct explanation for Statementl (c)Statement I is correct, Statement II is incorrect (d) Statement I is incorrect, Statement II is correct

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**495.** The equation of the line passing through the points of intersection of the circles $3x^2 + 3y^2 - 2x + 12y - 9 = 0$ and $x^2 + y^2 + 6x + 2y - 15 = 0$ is

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**496.** The locus of the mid-point of the chord of contact of tangents drawn from points lying on the straight line $4x - 5y = 20$ to the circle $x^2 + y^2 = 9$ is : (A) $20\left(x^2 + y^2\right) - 36 + 45y = 0$ (B) $20\left(x^2 + y^2\right) + 36 - 45y = 0$ (C) $20\left(x^2 + y^2\right) - 20x + 45y = 0$ (D) $20\left(x^2 + y^2\right) + 20x - 45y = 0$

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**497.** If the tangent at the point $P(2, 4)$ to the parabola $y^2 = 8x$ meets the parabola $y^2 = 8x + 5$ at $Q and R$, then find the midpoint of chord $QR$.

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**498.** Find the locus of the midpoints of the portion of the normal to the parabola $y^2 = 4ax$ intercepted between the curve and the axis.

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**499.** An equilateral triangle is inscribed in the parabola $y^2 = 4ax$, where one vertex is at the vertex of the parabola. Find the length of the side of the triangle.

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**500.** $M$ is the foot of the perpendicular from a point $P$ on a parabola $y^2 = 4ax$ to its directrix and $SPM$ is an equilateral triangle, where S is the focus. Then find $SP$ .

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**501.** Find the locus of the middle points of the chords of the parabola $y^2 = 4ax$ which subtend a right angle at the vertex of the parabola.

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**502.** A quadrilateral is inscribed in a parabola $y^2 = 4ax$ and three of its sides pass through fixed points on the axis. Show that the fourth side also passes through a fixed point on the axis of the parabola.

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**503.** A right-angled triangle $ABC$ is inscribed in parabola $y^2 = 4x$, where $A$ is the vertex of the parabola and $\angle BAC = \frac{\pi \cdot}{2}$ If $AB = \sqrt{5}$, then find the area of $ABC^{\cdot}$

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**504.** Let there be two parabolas $y^2 = 4ax$ and $y^2 = -4bx$ (where $a \neq banda, b > 0)$ . Then find the locus of the middle points of the intercepts between the parabolas made on the lines parallel to the common axis.

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**505.** The equation of aparabola is $y^2 = 4x\dot{P}(1, 3)$ and $Q(1, 1)$ are two points in the $xy - plane^{\cdot}$ Then, for the parabola. (a)$P$ and $Q$ are exterior points. (b)$P$ is an interior point while $Q$ is an exterior point (c)$P$ and $Q$ are interior points. (d)$P$ is an exterior point while $Q$ is an interior point

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**506.** $AP$ is perpendicular to $PB$ , where $A$ is the vertex of the parabola $y^2 = 4x$ and $P$ is on the parabola. $B$ is on the axis of the parabola. Then find the locus of the centroid of $PAB$ .

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**507.** Find the value of P such that the vertex of $y = x^2 + 2px + 13$ is 4 units above the x-axis. (a) $\pm 2$ (b) 4 (c) $\pm 3$ (d) 5

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**508.** The point $(a, 2a)$ is an interior point of the region bounded by the parabola $y^2 = 16x$ and the double ordinate through the focus. then find the values of $a$ .

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509. Find the point where the line $x + y = 6$ is a normal to the parabola $y^2 = 8x$.

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510. Find the equation of the tangent to the parabola $9x^2 + 12x + 18y - 14 = 0$ which passes through the point (0, 1).

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511. Find the angle between the tangents drawn to $y^2 = 4x$, where it is intersected by the line $y = x - 1$.

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**512.** How many distinct real tangents that can be drawn from $(0, -2)$ to the parabola $y^2 = 4x$?

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**513.** If the tangents at the points $PandQ$ on the parabola $y^2 = 4ax$ meet at $T, andS$ is its focus, the prove that $SP, ST, andSQ$ are in GP.

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**514.** The tangents to the parabola $y^2 = 4x$ at the points (1, 2) and (4,4) meet on which of the following lines?

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**515.** If the line $x + y = a$ touches the parabola $y = x - x^2$, then find the value of $a$

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**516.** Find the slopes of the tangents to the parabola $y^2 = 8x$ which are normal to the circle $x^2 + y^2 + 6x + 8y - 24 = 0$.

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**517.** Find the angle between the tangents drawn from (1, 3) to the parabola $y^2 = 4x$

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**518.** Determine all the values of $\alpha$ for which the point $\left(\alpha, \alpha^2\right)$ lies inside the triangle formed by the lines. $2x + 3y - 1 = 0$ $x + 2y - 3 = 0$ $5x - 6y - 1 = 0$

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**519.** The locus of the centre of a circle the touches the given circle externally is a ______

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**520.** If on a given base $BC$, a triangle is described such that the sum of the tangents of the base angles is $m$, then prove that the locus of the opposite vertex $A$ is a parabola.

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**521.** The parametric equation of a parabola is $x = t^2 + 1, y = 2t + 1$. Then find the equation of the directrix.

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**522.** $y^2 + 2y - x + 5 = 0$ represents a parabola. Find its vertex, equation of axis, equation of latus rectum, coordinates of the focus, equation of the directrix, extremities of the latus rectum, and the length of the latus rectum.

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**523.** Find the equation of the parabola which has axis parallel to the y-axis and which passes through the points $(0, 2), ( - 1, 0), and(1, 6)$.

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**524.** Prove that the focal distance of the point $(x, y)$ on the parabola $x^2 - 8x + 16y = 0$ is $|y + 5|$

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**525.** Find points on the parabola $y^2 - 2y - 4x = 0$ whose focal length is 6.

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**526.** If the length of the chord of circle $x^2 + y^2 = 4$ and $y^2 = 4(x - h)$ is maximum, then find the value of $h$ .

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**527.** From a variable point on the tangent at the vertex of a parabola $y^2 = 4ax$, a perpendicular is drawn to its chord of contact. Show that these variable perpendicular lines pass through a fixed point on the axis of the parabola.

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**528.** The locus of the middle points of the focal chords of the parabola, $y^2 = 4x$ is:

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529. If the distance of the point $(\alpha, 2)$ from its chord of contact w.r.t. the parabola $y^2 = 4x$ is 4, then find the value of $\dot{\alpha}$

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530. $TP$ and $TQ$ are tangents to the parabola $y^2 = 4ax$ at $PandQ$, respectively. If the chord $PQ$ passes through the fixed point $(-a, b)$, then find the locus of $\dot{T}$

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531. Find the locus of the midpoint of normal chord of parabola $y^2 = 4ax$

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532. If normal to the parabola $y^2 - 4ax = 0$ at $\alpha$ point intersects the parabola again such that the sum of ordinates of these two points is 3,

then show that the semi-latus rectum is equal to $-1.5\alpha$

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**533.** If the parabolas $y^2 = 4ax$ and $y^2 = 4c(x - b)$ have a common normal other than the x-axis ($a, b, c$ being distinct positive real numbers), then prove that $\frac{b}{a - c} > 2$.

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**534.** Find the angle made by a double ordinate of length $8a$ at the vertex of the parabola $y^2 = 4ax$

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**535.** The cable of a uniformly loaded suspension bridge hangs in the form of a parabola . The roadway which is horizontal and $100$ m long is supported by vertical wires attached to the cable, the longest wire being

30 m and the shortest being 6m. Find the length of a supporting wire attached to the roadway18 m from the middle.

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**536.** If the chord of contact of tangents from a point $P$ to the parabola $y^2 = 4ax$ touches the parabola $x^2 = 4by$, then find the locus of $P$

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**537.** If a normal to a parabola $y^2 = 4ax$ makes an angle $\phi$ with its axis, then it will cut the curve again at an angle

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**538.** Tangents are drawn to the parabola $y^2 = 4ax$ at the point where the line $lx + my + n = 0$ meets this parabola. Find the point of intersection of these tangents.

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**539.** Find the vertex of the parabola $x^2 = 2(2x + y)$

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**540.** Find the length of the common chord of the parabola $y^2 = 4(x + 3)$ and the circle $x^2 + y^2 + 4x = 0$ .

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**541.** Find the coordinates of any point on the parabola whose focus is (0, 1) and directrix is $x + 2 = 0$

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

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**543.** Find the length of the latus rectum of the parabola whose focus is at (2, 3) and directrix is the line $x - 4y + 3 = 0$.

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**544.** The focal chord of the parabola $y^2 = ax$ is $2x - y - 8 = 0$. Then find the equation of the directrix.

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**545.** The vertex of a parabola is (2, 2) and the coordinats of its two extremities of latus rectum are $(-2, 0)$ and (6, 0). Then find the equation of the parabola.

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**546.** Find the equation of the directrix of the parabola $x^2 - 4x - 3y + 10 = 0$

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**547.** Find the locus of the midpoint of chords of the parabola $y^2 = 4ax$ that pass through the point $(3a, a)$.

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**548.** If the normals to the parabola $y^2 = 4ax$ at the ends of the latus rectum meet the parabola at $Q$ and $Q'$, then $QQ'$ is

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**549.** If the normal to the parabola $y^2 = 4ax$ at point $t_1$ cuts the parabola again at point $t_2$ , then prove that $t_22 \geq 8$.

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**550.** If the normals from any point to the parabola $y^2 = 4x$ cut the line $x = 2$ at points whose ordinates are in AP, then prove that the slopes of tangents at the co-normal points are in GP.

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**551.** If (h,k) is a point on the axis of the parabola $2(x - 1)^2 + 2(y - 1)^2 = (x + y + 2)^2$from where three distinct normal can be drawn, then the least integral value of h is :

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**552.** A ray of light moving parallel to the X-axis gets reflected from a parabolic mirror whose equation is $(y - 2)^2 = 4(x + 1)$ . After reflection , the ray must pass through the point

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**553.** A circle and a parabola $y^2 = 4ax$ intersect at four points. Show that the algebraic sum of the ordinates of the four points is zero. Also show that the line joining one pair of these four points is equally inclined to the axis.

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**554.** A parabola mirror is kept along $y^2 = 4x$ and two light rays parallel to its axis are reflected along one straight line. If one of the incident light rays is at 3 units distance from the axis, then find the distance of the other incident ray from the axis.

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**555.** If incident from point $(-1, 2)$ parallel to the axis of the parabola $y^2 = 4x$ strike the parabola, then find the equation of the reflected ray.

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**556.** If the vertex of the parabola is $(3, 2)$ and directrix is $3x + 4y - \frac{19}{7} = 0$, then find the focus of the parabola.

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**557.** Find the value of $\lambda$ if the equation $(x - 1)^2 + (y - 2)^2 = \lambda(x + y + 3)^2$ represents a parabola. Also, find its focus, vertex, the equation of its directrix, the equation of axis, the equation of axis, the equation of latus rectum, the length of the latus rectum, and the extremities of the latus rectum.

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**558.** The equation of the latus rectum of a parabola is $x + y = 8$ and the equation of the tangent at the vertex is $x + y = 12$. Then find the length of the latus rectum.

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**559.** Find the value of $\lambda$ if the equation $9x^2 + 4y^2 + 2\lambda xy + 4x - 2y + 3 = 0$ represents a parabola.

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**560.** Find the range of values of $\lambda$ for which the point $(\lambda, -1)$ is exterior to both the parabolas $y^2 = |x|$

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**561.** Prove that the locus of a point, which moves so that its distance from a fixed line is equal to the length of the tangent drawn from it to a given circle, is a parabola.

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**562.** $LOL'$ and $MOM'$ are two chords of parabola $y^2 = 4ax$ with vertex $A$ passing through a point $O$ on its axis. Prove that the radical axis of the circles described on $LL'$ and $MM'$ as diameters passes though the vertex of the parabola.

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**563.** If $(a, b)$ is the midpoint of a chord passing through the vertex of the parabola $y^2 = 4x$, then prove that $2a = b^2$

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**564.** If three distinct normals can be drawn to the parabola $y^2 - 2y = 4x - 9$ from the point $(2a, b)$, then find the range of the value of $a$.

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**565.** Find the number of distinct normals that can be drawn from $(-2, 1)$ to the parabola $y^2 - 4x - 2y - 3 = 0$

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**566.** If the line passing through the focus $S$ of the parabola $y = ax^2 + bx + c$ meets the parabola at $PandQ$ and if $SP = 4$ and $SQ = 6$, then find the value of $a$.

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**567.** Find the locus of the point of intersection of the normals at the end of the focal chord of the parabola $y^2 = 4ax$.

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**568.** The abscissa and ordinates of the endpoints $AandB$ of a focal chord of the parabola $y^2 = 4x$ are, respectively, the roots of equations $x^2 - 3x + a = 0$ and $y^2 + 6y + b = 0$. Then find the equation of the circle with $AB$ as diameter.

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**569.** If $AB$ is a focal chord of $x^2 - 2x + y - 2 = 0$ whose focus is $S$ and $AS = l_1$, then find $BS$.

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**570.** A circle is drawn to pass through the extremities of the latus rectum of the parabola $y^2 = 8x^{\cdot}$ It is given that this circle also touches the directrix of the parabola. Find the radius of this circle.

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**571.** Circles drawn on the diameter as focal distance of any point lying on the parabola $x^2 - 4x + 6y + 10 = 0$ will touch a fixed line whose equation is -

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**572.** If the length of a focal chord of the parabola $y^2 = 4ax$ at $a$ distance $b$ from the vertex is $c$, then prove that $b^2c = 4a^{3^{\cdot}}$

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**573.** Find the equation of the parabola whose focus is $S(-1, 1)$ and directrix is $4x + 3y - 24 = 0$ . Also find its axis, the vertex, the length, and the equation of the latus rectum.

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**574.** Circles are drawn with diameter being any focal chord of the parabola $y^2 - 4x - y - 4 = 0$ with always touch a fixed line. Find its equation.

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**575.** If $(2, -8)$ is at an end of a focal chord of the parabola $y^2 = 32x$, then find the other end of the chord.

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**576.** Prove that the length of the intercept on the normal at the point $P\left(at^2, 2at\right)$ of the parabola $y^2 = 4ax$ made by the circle described on the line joining the focus and $P$ as diameter is $a\sqrt{1 + t^2}$.

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**577.** If $y = 2x + 3$ is a tangent to the parabola $y^2 = 24x$, then find its distance from the parallel normal.

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**578.** Three normals to $y^2 = 4x$ pass through the point (15, 12). Show that one of the normals is given by $y = x - 3$ and find the equation of the other.

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**579.** Find the locus of the point from which the two tangents drawn to the parabola $y^2 = 4ax$ are such that the slope of one is thrice that of the other.

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**580.** Find the angle between the tangents drawn from the origin to the parabolas $y^2 = 4a(x - a)$ (a) $90^\circ$ (b) $30^\circ$ (c) $\tan^{-1}\left(\frac{1}{2}\right)$ (d) $45^\circ$

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**581.** Find the locus of the point of intersection of the perpendicular tangents of the curve $y^2 + 4y - 6x - 2 = 0$.

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**582.** Three normals are drawn from the point (7, 14) to the parabola $x^2 - 8x - 16y = 0$. Find the coordinates of the feet of the normals.

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**583.** Find the equation of normal to the parabola $y = x^2 - x - 1$ which has equal intercept on the axes. Also find the point where this normal meets the curve again.

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**584.** If $y = x + 2$ is normal to the parabola $y^2 = 4ax$, then find the value of $\dot{a}$

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**585.** The coordinates of the ends of a focal chord of the parabola $y^2 = 4ax$ are $(x_1, y_1)$ and $(x_2, y_2)$. Then find the value of $x_1x_2 + y_1y_2$.

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**586.** If $t_1 and t_2$ are the ends of a focal chord of the parabola $y^2 = 4ax$, then prove that the roots of the equation $t_1x^2 + ax + t_2 = 0$ are real.

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**587.** If the length of focal chord of $y^2 = 4ax$ is $l$, then find the angle between the axis of the parabola and the focal chord.

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**588.** If length of focal chord $PQ$ is $l$, and $p$ is the perpendicular distance of $PQ$ from the vertex of the parabola, then prove that $l \propto \frac{1}{p^2}$.

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**589.** Find the equation of the tangent to the parabola $y^2 = 8x$ having slope 2 and also find the point of contact.

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**590.** Find the equation of tangents of the parabola $y^2 = 12x$, which passes through the point (2, 5).

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**591.** If the line $y = 3x + c$ touches the parabola $y^2 = 12x$ at point $P$, then find the equation of the tangent at point $Q$ where $PQ$ is a focal chord.

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**592.** Find the equation of the tangent to the parabola $y = x^2 - 2x + 3$ at point (2, 3).

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**593.** Find the equation of the tangent to the parabola $x = y^2 + 3y + 2$ having slope 1.

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**594.** Find the equation of tangents drawn to the parabola $y = x^2 - 3x + 2$ from the point $(1, -1)$.

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**595.** The parabola $y^2 = 4x$ and the circle having its center at (6, 5) intersect at right angle. Then find the possible points of intersection of these curves.

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**596.** The tangents to the parabola $y^2 = 4ax$ at the vertex $V$ and any point $P$ meet at $Q$ . If $S$ is the focus, then prove that $SP, SQ,$ and $SV$ are in GP.

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**597.** Show that $x\cos\alpha + y\sin\alpha = p$ touches the parabola $y^2 = 4ax$ if $p\cos\alpha + a\sin^2\alpha = 0$ and that the point of contact is $\left(a\tan^2\alpha, -2a\tan\alpha\right)^{.}$

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**598.** A tangent to the parabola $y^2 = 8x$ makes an angle of $45^0$ with the straight line $y = 3x + 5.$ Then find one of the points of contact.

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**599.** Find the equation of the common tangent of $y^2 = 4ax$ and $x^2 = 4ay$.

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**600.** If the lines $L_1 and L_2$ are tangents to $4x^2 - 4x - 24y + 49 = 0$ and are normals for $x^2 + y^2 = 72$, then find the slopes of $L_1$ and $L_2$.

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**601.** Find the shortest distance between the line $y = x - 2$ and the parabola $y = x^2 + 3x + 2$.

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**602.** If two tangents drawn from the point $(\alpha, \beta)$ to the parabola $y^2 = 4x$ are such that the slope of one tangent is double of the other, then prove that $\alpha = \frac{2}{9}\beta^2$.

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**603.** Two tangent are drawn from the point $(-2, -1)$ to parabola $y^2 = 4x$. if $\alpha$ is the angle between these tangents, then find the value of $\tan\alpha$.

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**604.** Find the angle at which normal at point $P\left(at^2, 2at\right)$ to the parabola meets the parabola again at point $Q$.

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**605.** If tangents are drawn to $y^2 = 4ax$ from any point $P$ on the parabola $y^2 = a(x + b)$, then show that the normals drawn at their point for contact meet on a fixed line.

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606. Find the equation of a parabola having its focus at $S(2, 0)$ and one extremity of its latus rectum at (2, 2)

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607. Find the equation of a parabola having focus at $(0, -3)$ and directix $y = 3$

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608. Find the equation of a parabola having its vertex at $A(1, 0)$ and focus at $S(3, 0)$

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609. A beam is supported at its ends by supports which are 12 metres apart. Since tha load is concentrated at its centre, there is a deflection of

3 cm at the centre and the deflected beam is in the shape of a parabola. How far from the centre is the deflection 1 cm ?

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**610.** Find the coordinates of points on the parabola $y^2 = 8x$ whose focal distance is 4.

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**611.** If a parabolic reflector is 20 cm in diameter and 5 cm deep, find the focus.

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

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**614.** The chord $AB$ of the parabola $y^2 = 4ax$ cuts the axis of the parabola at $\dot{C}$ If $A \equiv \left(at_1^2, 2at_1\right), B \equiv \left(at_2^2, 2at_2\right)$, and $AC:AB1:3$, then prove that $t_2 + 2t_1 = 0$.

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**615.** Prove that the chord $y - x\sqrt{2} + 4a\sqrt{2} = 0$ is a normal chord of the parabola $y^2 = 4ax$. Also find the point on the parabola when the given chord is normal to the parabola.

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616. Find the point on the curve $y^2 = ax$ the tangent at which makes an angle of $45^\circ$ with the x-axis.

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617. Find the points of contact $Q$ and $R$ of a tangent from the point $P(2, 3)$ on the parabola $y^2 = 4x$

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618. Two straight lines $(y - b) = m_1(x + a)$ and $(y - b) = m_2(x + a)$ are the tangents of $y^2 = 4ax$. Prove $m_1 m_2 = -1$.

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619. The equation of a straight line whose x intercept is 3 and y intercept is 4 is :

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**620.** Tangents are drawn to the parabola $(x - 3)^2 + (y + 4)^2 = \frac{(3x - 4y - 6)^2}{25}$ at the extremities of the chord $2x - 3y - 18 = 0$. Find the angle between the tangents.

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**621.** The locus of the point of intersection of perependicular tangent of the parabola $y^2 = 4ax$ is

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**622.** Mutually perpendicular tangents $TAandTB$ are drawn to $y^2 = 4ax$. Then find the minimum length of $AB$

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**623.** Tangent $PAandPB$ are drawn from the point $P$ on the directrix of the parabola $(x-2)^2 + (y-3)^2 = \frac{(5x-12y+3)^2}{160}$. Find the least radius of the circumcircle of triangle $PAB$

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**624.** A square has one vertex at the vertex of the parabola $y^2 = 4ax$ and the diagonal through the vertex lies along the axis of the parabola. If the ends of the other diagonal lie on the parabola, the coordinates of the vertices of the square are (a)$(4a, 4a)$ (b) $(4a, -4a)$ (c)$(0, 0)$ (d) $(8a, 0)$

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**625.** P, Q, and R are the feet of the normals drawn to a parabola $(y-3)^2 = 8(x-2)$. A circle cuts the above parabola at points P, Q, R, and S. Then this circle always passes through the point. (a)(2, 3)(b)(3, 2)(c)(0, 3) (d) (2, 0 )

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**626.** The equation of the line that passes through $(10, -1)$ and is perpendicular to $y = \frac{x^2}{4} - 2$ is $(a)4x + y = 39$ (b) $2x + y = 19$ $(c)x + y = 9$ (d) $x + 2y = 8$

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**627.** The axis of a parabola is along the line $y = x$ and the distance of its vertex and focus from the origin are $\sqrt{2}$ and $2\sqrt{2}$ , respectively. If vertex and focus both lie in the first quadrant, then the equation of the parabola is $(x + y)^2 = (x - y - 2)$ $(x - y)^2 = (x + y - 2)$ $(x - y)^2 = 4(x + y - 2)$ $(x - y)^2 = 8(x + y - 2)$

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**628.** If the normal chhord of the parabola $y^2 = 4x$ makes an angle $45°$ with the axis of the parabola, then its length, is

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629. If the normals at points $t_1 and t_2$ meet on the parabola, then $t_1 t_2 = 1$ (b) $t_2 = -t_1 - \frac{2}{t_1}$ $t_1 t_2 = 2$ (d) none of these

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630. From a point $(\sin\theta, \cos\theta)$, if three normals can be drawn to the parabola $y^2 = 4ax$ then the value of a is

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631. If the normals to the parabola $y^2 = 4ax$ at the ends of the latus rectum meet the parabola at $Q$ and $Q'$, then $QQ'$ is

A. $(a)10a$

B. (b) $4a$

C. (c) $20a$

D. (d) $12a$

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**632.** If two normals to a parabola $y^2 = 4ax$ intersect at right angles then the chord joining their feet pass through a fixed point whose co-ordinates are:

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**633.** If the normals to the parabola $y^2 = 4ax$ at $P$ meets the curve again at $Q$ and if $PQ$ and the normal at $Q$ make angle $\alpha$ and $\beta$ , respectively, with the x-axis, then $tan\alpha(\tan\alpha + \tan\beta)$ has the value equal to 0 (b) -2 (c) $-\frac{1}{2}$ (d) $-1$

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**634.** If a leaf of a book is folded so that one corner moves along an opposite side, then prove that the line of crease will always touch parabola.

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**635.** A parabola of latus rectum $l$ touches a fixed equal parabola. The axes of two parabolas are parallel. Then find the locus of the vertex of the moving parabola.

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**636.** A movable parabola touches x-axis and y-axis at (0,1) and (1,0). Then the locus of the focus of the parabola is :

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**637.** Let $N$ be the foot of perpendicular to the x-axis from point $P$ on the parabola $y^2 = 4ax$. A straight line is drawn parallel to the axis which bisects $PN$ and cuts the curve at $Q$; if $NQ$ meets the tangent at the vertex at a point then prove that $AT = \frac{2}{3}PN$.

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**638.** Two lines are drawn at right angles, one being a tangent to $y^2 = 4ax$ and the other $x^2 = 4by$. Then find the locus of their point of intersection.

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**639.** The area of the trapezium whose vertices lie on the parabola $y^2 = 4x$ and its diagonals pass through (1,0) and having length $\frac{25}{4}$ units each is

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**640.** Find the range of parameter $a$ for which a unique circle will pass through the points of intersection of the hyperbola $x^2 - y^2 = a^2$ and the parabola $y = x^2$. Also, find the equation of the circle.

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**641.** Find the radius of the largest circle, which passes through the focus of the parabola $y^2 = 4(x + y)$ and is also contained in it.

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**642.** A tangent is drawn to the parabola $y^2 = 4ax$ at $P$ such that it cuts the y-axis at $Q$. A line perpendicular to this tangents is drawn through $Q$ which cuts the axis of the parabola at $R$. If the rectangle $PQRS$ is completed, then find the locus of $S$.

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**643.** Tangents are drawn to the parabola at three distinct points. Prove that these tangent lines always make a triangle and that the locus of the orthocentre of the triangle is the directrix of the parabola.

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**644.** Statement 1: The point of intersection of the tangents at three distinct points $A, B, and C$ on the parabola $y^2 = 4x$ can be collinear. Statement 2: If a line $L$ does not intersect the parabola $y^2 = 4x$, then from every point of the line, two tangents can be drawn to the parabola.

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**645.** Statement 1: If the straight line $x = 8$ meets the parabola $y^2 = 8x$ at $PandQ$, then $PQ$ substends a right angle at the origin. Statement 2: Double ordinate equal to twice of latus rectum of a parabola subtends a right angle at the vertex.

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**646.** If a normal chord subtends a right at the vertex of the parabola `y^(2)=4ax,then find its inclination to the axis.

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**647.** Statement 1: The value of $\alpha$ for which the point $\left(\alpha, \alpha^2\right)$ lies inside the triangle formed by the lines $x = 0, x + y = 2$ and $3y = x$ is $(0, 1)^{.}$ Statement 2: The parabola $y = x^2$ meets the line$x + y = 2$ at$(0, 1)^{.}$

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**648.** Let $L$ be a normal to the parabola $y^2 = 4x^{.}$ If $L$ passes through the point (9, 6), then $L$ is given by `

A. (a)$y - x + 3 = 0$

B. (b) $y + 3x - 33 = 0$

C. $(c) y + x - 15 = 0$

D. (d) $y - 2x + 12 = 0$

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**649.** Let P and Q be distinct points on the parabola $y^2 = 2x$ such that a circle with PQ as diameter passes through the vertex O of the parabola. If P lies in the first quadrant and the area of the triangle $\Delta OPQ$ is $3\sqrt{2}$ , then which of the following is (are) the coordinates of $P$?

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**650.** The tangent at any point $P$ onthe parabola $y^2 = 4ax$ intersects the y-axis at $Q$. Then tangent to the circumcircle of triangle $PQS(S$ is the focus) at $Q$ is

A. a. a line parallel to x-axis

B. b.y-axis

C. c.a line parallel to y-axis

D. (d) none of these

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651. If $y = m_1x + c$ and $y = m_2x + c$ are two tangents to the parabola $y^2 + 4a(x + a) = 0$, then

A. (a)$m_1 + m_2 = 0$

B. (b) `1+m_1+m_2=0

C. (c)$m_1m_2 - 1 = 0$

D. (d) $1 + m_1m_2 = 0$

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**652.** $AB$ is a double ordinate of the parabola $y^2 = 4ax$ Tangents drawn to the parabola at $AandB$ meet the y-axis at $A_1andB_1$ , respectively. If the area of trapezium $\forall_1 B_1 B$ is equal to $12a^2$, then the angle subtended by $A_1B_1$ at the focus of the parabola is equal to $2\tan^{-1}(3)$ (b) $\tan^{-1}(3)$ $2\tan^{-1}(2)$ (d) $\tan^{-1}(2)$

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**653.** If $y + 3 = m_1(x + 2)$ and $y + 3 = m_2(x + 2)$ are two tangents to the parabola $y^2 = 8x$, then

A. (a)$m_1 + m_2 = 0$

B. (b) $m_1 + m_2 = -1$

C. (c)$m_1 + m_2 = 1$

D. (d) none of these

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**654.** A line of slope $\lambda(0 < \lambda < 1)$ touches the parabola $y + 3x^2 = 0$ at $P$. If $S$ is the focus and $M$ is the foot of the perpendicular of directrix from $P$, then $\tan\angle MPS$

A. (A) $2\lambda$

B. (B) $\dfrac{2\lambda}{-1 + \lambda^2}$

C. (c) $\dfrac{1 - \lambda^2}{1 + \lambda^2}$

D. (D) none of these

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**655.** If $y = 2x - 3$ is tangent to the parabola $y^2 = 4a\left(x - \frac{1}{3}\right)$, then $a$ is equal to

A. (a) $\dfrac{22}{3}$

B. (b) $-1$

C. (c) $\frac{14}{3}$

D. (d) $\frac{-14}{3}$

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**656.** The straight lines joining any point $P$ on the parabola $y^2 = 4ax$ to the vertex and perpendicular from the focus to the tangent at $P$ intersect at $R$. Then the equation of the locus of $R$ is

A. (a) $x^2 + 2y^2 - ax = 0$

B. (b) $2x^2 + y^2 - 2ax = 0$

C. (c)$2x^2 + 2y^2 - ay = 0$

D. (d) $2x^2 + y^2 - 2ay = 0$

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**657.** Through the vertex $O$ of the parabola $y^2 = 4ax$ , two chords $OPandOQ$ are drawn and the circles on OP and OQ as diameters intersect at $\dot{R}$ If $\theta_1, \theta_2$ , and $\varphi$ are the angles made with the axis by the tangents at $P$ and $Q$ on the parabola and by $OR,$ then value of $\cot\theta_1 + \cot\theta_2$ is

A. a. $-2\tan\varphi$

B. (b) $-2\tan(\pi - \varphi)$

C. (c) 0

D. (d) $2\cot\varphi$

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**658.** A tangent is drawn to the parabola $y^2 = 4x$ at the point $P$ whose abscissa lies in the interval (1, 4). The maximum possible area of the triangle formed by the tangent at $P,$ the ordinates of the point $P,$ and the x-axis is equal to

A. (a)8

B. (b) 16

C. (c) 24

D. (d) 32

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**659.** A parabola $y = ax^2 + bx + c$ crosses the x-axis at $(\alpha, 0)$ and $(\beta, 0)$ both to the right of the origin. A circle also pass through these two points. The length of a tangent from the origin to the circle is

A. (a)$\sqrt{\frac{bc}{a}}$

B. (b) $ac^2$

C. (c) $\frac{b}{a}$

D. (d) $\sqrt{\frac{c}{a}}$

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**660.** From a point on the circle $x^2 + y^2 = a^2$, two tangents are drawn to the circle $x^2 + y^2 = b^2 (a > b)$. If the chord of contact touches a variable circle passing through origin, show that the locus of the center of the variable circle is always a parabola.

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**661.** A line $AB$ makes intercepts of lengths $aandb$ on the coordinate axes. Find the equation of the parabola passing through $A, B,$ and the origin, if $AB$ is the shortest focal chord of the parabola.

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**662.** Prove that the line joining the orthocentre to the centroid of a triangle formed by the focal chord of a parabola and tangents drawn at its extremities is parallel to the axis of the parabola.

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663. $A$ is a point on the parabola $y^2 = 4ax$ . The normal at A cuts the parabola again at point $B$. If $AB$ subtends a right angle at the vertex of the parabola, find the slope of $AB$.

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664. Let PQ be a chord of the parabola $y^2 = 4x$. A circle drawn with PQ as a diameter passes through the vertex V of theparabola. If $ar(\Delta PVQ) = 20$ sq unit then the coordinates of P are

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665. Each question has four choices a, b, c and d, out of which only one is correct. Each question contains Statement 1 and Statement 2. Find the correct answer. Statement 1 : Slopes of tangents drawn from (4, 10) to

theparabola $y^2 = 9x$ are and 1/4 and 9/4 . Statement 2 : Two tangents can be drawn to a parabola from any point lying outside the parabola.

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**666.** Statement 1: The line joining the points $(8, -8) and \left(\frac{1}{2}, 2\right)$, which are on the parabola $y^2 = 8x$, passes through the focus of the parabola. Statement 2: Tangents drawn at $(8, -8)$ and $\left(\frac{1}{2}, 2\right)$, on the parabola $y^2 = 4ax$ are perpendicular.

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**667.** The vertices $A, BandC$ of a variable right triangle lie on a parabola $y^2 = 4x$. If the vertex $B$ containing the right angle always remains at the point (1, 2), then find the locus of the centroid of triangle $ABC$.

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**668.** Show that the common tangents to the parabola $y^2 = 4x$ and the circle $x^2 + y^2 + 2x = 0$ form an equilateral triangle.

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**669.** Consider a curve $C: y^2 - 8x - 2y - 15 = 0$ in which two tangents $T_1 and T_2$ are drawn from $P(-4, 1)$ . Statement 1: $T_1 and T_2$ are mutually perpendicular tangents. Statement 2: Point $P$ lies on the axis of curve $\dot{C}$

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**670.** Statement 1: The line $ax + by + c = 0$ is a normal to the parabola $y^2 = 4\dot{a}x$ Then the equation of the tangent at the foot of this normal is $y = \left(\frac{b}{a}\right)x + \left(\frac{a^2}{b}\right)^{.}$ Statement 2: The equation of normal at any point $P\left(at^2, 2at\right)$ to the parabola $y^2$ =$4axisy = -tx + 2at + at^3$

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**671.** Statement 1: The length of focal chord of a parabola $y^2 = 8x$ making on an angle of $60^0$ with the x-axis is 32. Statement 2: The length of focal chord of a parabola $y^2 = 4ax$ making an angle with the x-axis is $4a\text{cosec}^2\alpha$

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**672.** Statement 1: $(5x - 5)^2 + (5y + 10)^2 = (3x + 4y + 5)^2$ is a parabola. Statement 2: If the distance of the point from a given line and from a given point (not lying on the given line) is equal, then the locus of the variable point is a parabola.

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**673.** If the bisector of angle $APB$, where $PAandPB$ are the tangents to the parabola $y^2 = 4ax$, is equally, inclined to the coordinate axes, then the point $P$ lies on

A. a.tangent at vertex of the parabola

B. b. directrix of the parabola

C. c. circle with center at the origin and radius $a$

D. d. the line of the latus rectum.

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**674.** If $d$ is the distance between the parallel tangents with positive slope to $y^2 = 4x$ and $x^2 + y^2 - 2x + 4y - 11 = 0$ , then (a)$10 < d < 2$ (b)$4 < d < 6$(c) $d < 4$ (d) none of these

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**675.** If $P\left(t^2, 2t\right), t \in [0, 2]$ , is an arbitrary point on the parabola $y^2 = 4x, Q$ is the foot of perpendicular from focus $S$ on the tangent at $P,$ then the maximum area of $PQS$ is (a)1 (b) 2 (c) $\frac{5}{16}$ (d) 5

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**676.** If the parabola $y = ax^2 - 6x + b$ passes through $(0, 2)$ and has its tangent at $x = \frac{3}{2}$ parallel to the x-axis, then (a)$a = 2, b = -2$ (b) $a = 2, b = 2$ (c)$a = -2, b = 2$ (d) $a = -2, b = -2$

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**677.** If the locus of the middle of point of contact of tangent drawn to the parabola $y^2 = 8x$ and the foot of perpendicular drawn from its focus to the tangents is a conic, then the length of latus rectum of this conic is $\frac{9}{4}$ (b) 9 (c) 18 (d) $\frac{9}{2}$

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**678.** At any point P on the parabola $y^2 - 2y - 4x + 5 = 0$ a tangent is drawn which meets the directrix at Q. Find the locus of point R which divides QP externally in the ratio $\frac{1}{2} : 1$

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**679.** The point of intersection of the tangents at the ends of the latus rectum of the parabola $y^2 = 4x$ is___________

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**680.** From a pt A common tangents are drawn to a circle $x^2 + y^2 = \frac{a^2}{2}$ and $y^2 = 4ax$. Find the area of the quadrilateral formed by common tangents, chord of contact of circle and chord of contact of parabola.

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**681.** Let $C_1$ and $C_2$ be parabolas $x^2 = y - 1$ and $y^2 = x - 1$ respectively. Let P be any point on $C_1$ and Q be any point $C_2$. Let $P_1$ and $Q_1$ be the reflection of P and Q, respectively w.r.t the line y = x then prove that $P_1$ lies on $C_2$ and $Q_1$ lies on $C_1$ and $PQ \geq \left[PP_1, QQ_1\right]$. Hence or otherwise , determine points $P_0$ and $Q_0$ on the parabolas $C_1$ and $C_2$ respectively such that $P_0Q_0 \leq PQ$ for all pairs of points (P,Q) with P on $C_1$ and Q on $C_2$

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**682.** Three normals with slopes $m_1, m_2$ and $m_3$ are down from a point P not on the axis of the axis of the parabola $y^2 = 4x$. If $m_1m_2 = \alpha$, results in the locus of P being a part of parabola, Find the value of $\alpha$

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**683.** Three normals are drawn from the point (c, 0) to the curve $y^2 = x$. Show that c must be greater than 1/2. One normal is always the axis. Find c for which the other two normals are perpendicular to each other.

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684. Show that the locus of a point that divides a chord of slope 2 of the parabola $y^2 = 4x$ internally in the ratio $1:2$ is parabola. Find the vertex of this parabola.

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685. Points A, B, C lie on the parabola $y^2 = 4ax$ The tangents to the parabola at A, B and C, taken in pair, intersect at points P, Q and R. Determine the ratio of the areas of the $\triangle ABC$ and $\triangle PQR$

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686. If the focus of the parabola $x^2 - ky + 3 = 0$ is (0,2), then a values of $k$ is (are) 4 (b) 6 (c) 3 (d) 2

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**687.** Let $P$ be a point whose coordinates differ by unity and the point does not lie on any of the axes of reference. If the parabola $y^2 = 4x + 1$ passes through $P$, then the ordinate of $P$ may be (a) 3 (b) -1 (c) 5 (d) 1

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**688.** Statement 1: The line $x - y - 5 = 0$ cannot be normal to the parabola $(5x - 15)^2 + (5y + 10)^2 = (3x - 4y + 2)^2$. Statement 2: Normal to parabola never passes through its focus.

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**689.** If $(h, k)$ is a point on the axis of the parabola $2(x - 1)^2 + 2(y - 1)^2 = (x + y + 2)^2$ from where three distinct normals can be drawn, then prove that $h > 2$.

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**690.** Column I, Column II Points from which perpendicular tangents can be drawn to the parabola $y^2 = 4x$ , p. $(-1, 2)$ Points from which only one normal can be drawn to the parabola $y^2 = 4x$ , q. (3, 2) Point at which chord $x - y - 1 = 0$ of the parabola $y^2 = 4x$ is bisected., r. $(-1, -5)$ Points from which tangents cannot be drawn to the parabola $y^2 = 4x$ , s. $(5, -2)$

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**691.** Consider the parabola $y^2 = 12x$ Column I, Column II Equation of tangent can be, p. $2x + y - 6 = 0$ Equation of normal can be, q. $3x - y + 1 = 0$ Equation of chord of contact w.r.t. any point on the directrix can be, r. $x - 2y - 12 = 0$ Equation of chord which subtends right angle at the vertex can be, s. $2x - y - 36 = 0$

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**692.** If the tangent at the point $P(2, 4)$ to the parabola $y^2 = 8x$ meets the parabola $y^2 = 8x + 5$ at $QandR,$ then find the midpoint of chord $QR$

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**693.** Let $P$ be the family of parabolas $y = x^2 + px + q, (q \neq 0)$, whose graphs cut the axes at three points. The family of circles through these three points have a common point

A. a.(1, 0)

B. (b) (0, 1)

C. (c) (1, 1)

D. (d) none of these

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**694.** If normal at point $P$ on the parabola $y^2 = 4ax, (a > 0)$, meets it again at $Q$ in such a way that $OQ$ is of minimum length, where $O$ is the vertex of parabola, then $OPQ$ is

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695. If line $PQ$ , where equation is $y = 2x + k$ , is a normal to the parabola whose vertex is $(-2, 3)$ and the axis parallel to the x-axis with latus rectum equal to 2, then the value of $k$ is $\frac{58}{8}$ (b) $\frac{50}{8}$ (c) $1$ (d) $-1$

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696. Tangent is drawn at any point $(p, q)$ on the parabola $y^2 = 4ax$ .Tangents are drawn from any point on this tangent to the circle $x^2 + y^2 = a^2$ , such that the chords of contact pass through a fixed point $(r, s)$. Then $p, q, r$ and$s$ can hold the relation (A) $r^2q = 4p^2s$ (B) $rq^2 = 4ps^2$ (C) $rq^2 = -4ps^2$ (D) $r^2q = -4p^2s$

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697. The equation of the directrix of the parabola with vertex at the origin and having the axis along the x-axis and a common tangent of slope 2

with the circle $x^2 + y^2 = 5$ is (are) (a)$x = 10$ (b) $x = 20$ (c)$x = -10$ (d) $x = -20$

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**698.** Tangent is drawn at any point $(x_1, y_1)$ other than the vertex on the parabola $y^2 = 4ax$ . If tangents are drawn from any point on this tangent to the circle $x^2 + y^2 = a^2$ such that all the chords of contact pass through a fixed point $(x_2, y_2)$, then (a)$x_1, a, x_2$ in GP (b) $\frac{y_1}{2}, a, y_2$ are in GP (c) $-4, \frac{y_1}{y_2}$, (x_1//x_2)$are \in GP(d)$x_1x_2+y_1y_2=a^2`

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**699.** The angle between the tangents to the curve $y = x^2 - 5x + 6$ at the point (2, 0) and (3, 0) is $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\pi$ (d) $\frac{\pi}{4}$

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**700.** If a line $y = 3x + 1$ cuts the parabola $x^2 - 4x - 4y + 20 = 0$ at $AandB$, then the tangent of the angle subtended by line segment $AB$ at the origin is $\frac{8\sqrt{3}}{205}$ (b) $\frac{8\sqrt{3}}{209}$ $\frac{8\sqrt{3}}{215}$ (d) none of these

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**701.** $P(x, y)$ is a variable point on the parabola $y^2 = 4ax$ and $Q(x + c, y + c)$ is another variable point, where $c$ is a constant. The locus of the midpoint of $PQ$ is an (a)parabola (b) ellipse (c)hyperbola (d) circle

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**702.** If $aandc$ are the lengths of segments of any focal chord of the parabola $y^2 = 2bx, (b > 0)$, then the roots of the equation $ax^2 + bx + c = 0$ are (a)real and distinct (b) real and equal (c)imaginary (d) none of these

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**703.** AB is a chord of the parabola $y^2 = 4ax$ with its vertex at A. BC is drawn perpendicular to AB meeting the axis at C.The projecton of BC on the axis of the parabola is

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**704.** The set of values of $\alpha$ for which the point $(\alpha, 1)$ lies inside the curves $c_1 : x^2 + y^2 - 4 = 0$ and $c_2 : y^2 = 4x$ is $|\alpha|$

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**705.** If P be a point on the parabola $y^2 = 3(2x - 3)$ and M is the foot of perpendicular drawn from the point P on the directrix of the parabola, then length of each sides of an equilateral triangle SMP(where S is the focus of the parabola), is

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**706.** If $x = mx + c$ touches the parabola $y^2 = 4a(x + a)$, then (a)$c = \frac{a}{m}$ (b) $c = am + \frac{a}{m}$ (c)$c = a + \frac{a}{m}$ (d) none of these

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**707.** The angle between the tangents to the parabola $y^2 = 4ax$ at the points where it intersects with the line $x - y - a = 0$ is (a)$\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\pi$ (d) $\frac{\pi}{2}$

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**708.** Double ordinate $AB$ of the parabola $y^2 = 4ax$ subtends an angle $\frac{\pi}{2}$ at the focus of the parabola. Then the tangents drawn to the parabola at $AandB$ will intersect at $( - 4a, 0)$ (b) $( - 2a, 0)$ $( - 3a, 0)$ (d) none of these

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**709.** The tangent PT and the normal PN to the parabola $y^2 = 4ax$ at a point P on it meet its axis at points T and N, respectively. The locus of the centroid of the triangle PTN is a parabola whose:

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**710.** Let A and B be two distinct points on the parabola $y^2 = 4x$. If the axis of the parabola touches a circle of radius r having AB as its diameter, then the slope of the line joining A and B can be

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**711.** The equations of the common tangents to the parabola $y = x^2$ and $y = -(x-2)^2$ is/are :

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**712.** Let $P(x_1, y_1)$ and $Q(x_2, y_2), y_1 < 0, y_2 < 0$, be the end points of the latus rectum of the ellipse $x^2 + 4y^2 = 4$. The equations of parabolas with latus rectum PQ are

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**713.** Let (x,y) be any point on the parabola $y^2 = 4x$. Let P be the point that divides the line segment from (0,0) and (x,y) n the ratio 1:3. Then the locus of P is :

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**714.** The common tangents to the circle $x^2 + y^2 = 2$ and the parabola $y^2 = 8x$ touch the circle at $P, Q$ andthe parabola at $R, S$. Then area of quadrilateral $PQRS$ is

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**715.** If two distinct chords of a parabola $y^2 = 4ax$ , passing through (a,2a) are bisected by the line x+y=1 ,then length of latus rectum can be

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**716.** Which of the following line can be normal to parabola $y^2 = 12x$? (a) $x + y - 9 = 0$ (b) $2x - y - 32 = 0$ (c)$2x + y - 36 = 0$ (d) $3x - y - 72 = 0$

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**717.** Which of the following line can be tangent to the parabola $y^2 = 8x$? (a)$x - y + 2 = 0$ (b) $9x - 3y + 2 = 0$ (c)$x + 2y + 8 = 0$ (d) $x + 3y + 12 = 0$

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**718.** The locus of the midpoint of the midpoint of the focal distance of a variable point moving on the parabola $y^2 4ax$ is a parabola whose

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**719.** A quadrilateral is inscribed in a parabola. Then (a)the quadrilateral may be cyclic (b)diagonals of the quadrilateral may be equal (c)allpossible pairs of the adjacent side may be perpendicular (d)none of these

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**720.** A normal drawn to the parabola $y^2 = 4ax$ meets the curve again at $Q$ such that the angle subtended by $PQ$ at the vertex is $90^0$. Then the coordinates of $P$ can be (a)$\left(8a, 4\sqrt{2}a\right)$ (b) $(8a, 4a)$ (c)$\left(2a, -2\sqrt{2}a\right)$ (d) $\left(2a, 2\sqrt{2}a\right)$

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**721.** The parabola $y^2 = 4x$ and the circle having its center at 6, 5) intersect at right angle. Then find the possible points of intersection of these curves.

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**722.** The extremities of latus rectum of a parabola are (1, 1) and $(1, -1)$. Then the equation of the parabola can be (a)$y^2 = 2x - 1$ (b) $y^2 = 1 - 2x$ (c) $y^2 = 2x - 3$ (d) $y^2 = 2x - 4$

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**723.** If $y = 2$ is the directrix and $(0, 1)$ is the vertex of the parabola $x^2 + \lambda y + \mu = 0$, then (a)$\lambda = 4$ (b) $\mu = 8$ (c) $\lambda = -8$ (d) $\mu = 4$

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**724.** Through the vertex 'O' of parabola $y^2 = 4x$, chords OP and OQ are drawn at right angles to one another. Show that for all positions of P, PQ cuts the axis of the parabola at a fixed point. Also find the locus of the middle point of PQ.

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**725.** The set of all real numbers $x$ for which $x^2 - |x+2| + x > 0$ is $(-\infty, -2)$

b. $\left(-\infty, -\sqrt{2}\right) \cup \left(\sqrt{2}, \infty\right)$ c. $(-\infty, -1) \cup (1, \infty)$ d.$\left(\sqrt{2}, \infty\right)$

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**726.** Statement 1: If the endpoints of two normal chords $ABandCD$ (normal at $AandC$) of a parabola $y^2 = 4ax$ are concyclic, then the tangents at $AandC$ will intersect on the axis of the parabola. Statement 2: If four points on the parabola $y^2 = 4ax$ are concyclic, then the sum of their ordinates is zero.

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**727.** Consider the parabola $y^2 = 4x$ Let $A \equiv (4, -4)$ and $B \equiv (9, 6)$ be two fixed points on the parabola. Let $C$ be a moving point on the parabola between $AandB$ such that the area of the triangle $ABC$ is maximum. Then the coordinates of $C$ are (a) $\left(\frac{1}{4}, 1\right)$ (b) $(4, 4)$ (c) $\left(3, \frac{2}{\sqrt{3}}\right)$ (d) $\left(3, -2\sqrt{3}\right)$

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**728.** The mirror image of the parabola $y^2 = 4x$ in the tangent to the parabola at the point (1, 2) is (a)$(x-1)^2 = 4(y+1)$ (b) $(x+1)^2 = 4(y+1)$ (c) $(x+1)^2 = 4(y-1)$ (d) $(x-1)^2 = 4(y-1)$

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**729.** Two straight lines are perpendicular to each other. One of them touches the parabola $y^2 = 4a(x+a)$ and the other touches $y^2 = 4b(x+b)$. Their point of intersection lies on the line. (a)$x - a + b = 0$ (b) $x + a - b = 0$ (c)$x + a + b = 0$ (d) $x - a - b = 0$

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**730.** If the tangents and normal at the extremities of focal chord of a parabola intersect at the extremities of a focal chord of a parabola intersect at $(x_1, y_1)$ and $(x_2, y_2)$, respectively, then

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**731.** Radius of the circle that passes through the origin and touches the parabola $y^2 = 4ax$ at the point $(a, 2a)$ is (a)$\frac{5}{\sqrt{2}}a$ (b) $2\sqrt{2}a$ (c)$\sqrt{\frac{5}{2}}a$ (d) $\frac{3}{\sqrt{2}}a$

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**732.** If $A_1B_1$ and $A_2B_2$ are two focal chords of the parabola $y^2 = 4ax,$ then the chords $A_1A_2$ and $B_1B_2$ intersect on (a)directrix (b) axis (c)tangent at vertex (d) none of these

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**733.** The tangent and normal at $P(t)$, for all real positive $t$, to the parabola $y^2 = 4ax$ meet the axis of the parabola in $T$ and $G$ respectively, then the angle at which the tangent at $P$ to the parabola is inclined to the tangent at $P$ to the circle passing through the points $P, T$ and $G$ is

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**734.** $y = x + 2$ is any tangent to the parabola $y^2 = 8x$. The point $P$ on this tangent is such that the other tangent from it which is perpendicular to it is (a)$(2, 4)$ (b) $(-2, 0)$ (c)$(-1, 1)$ (d) $(2, 0)$

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**735.** Two parabola have the same focus. If their directrices are the x-axis and the y-axis respectively, then the slope of their common chord is :

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**736.** The triangle PQR of area 'A' is inscribed in the parabola $y^2 = 4ax$ such that the vertex P lies at the vertex pf the parabola and base QR is a focal chord.The modulus of the difference of the ordinates of the points Q and R is :

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**737.** The length of the chord of the parabola $y^2 = x$ which is bisected at the point (2, 1) is (a)$2\sqrt{3}$ (b) $4\sqrt{3}$ (c) $3\sqrt{2}$ (d) $2\sqrt{5}$

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**738.** The circle $x^2 + y^2 = 5$ meets the parabola $y^2 = 4x$ at $P$ and $Q$ . Then the length $PQ$ is equal to (A) 2 (B) $2\sqrt{2}$ (C) 4 (D) none of these

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**739.** A line is drawn form $A(-2, 0)$ to intersect the curve $y^2 = 4x$ at $P$ and $Q$ in the first quadrant such that $\frac{1}{AP} + \frac{1}{AQ} < \frac{1}{4}$ Then the slope of the line is always. (A) $> \sqrt{3}$ (B) $< \frac{1}{\sqrt{3}}$ (C) $> \sqrt{2}$ (D) $> \frac{1}{\sqrt{3}}$

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**740.** Let $y = f(x)$ be a parabola, having its axis parallel to the y-axis, which is touched by the line $y = x$ at $x = 1$. Then, (a)$2f(0) = 1 - f'(0)$ (b) $f(0) + f'(0) + f^0 = 1$ (c)$f'(1) = 1$ (d) $f'(0) = f'(1)$

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**741.** Two mutually perpendicular tangents of the parabola $y^2 = 4ax$ meet the axis at $P_1 and P_2$. If $S$ is the focus of the parabola, then $\frac{1}{SP_1}$ is equal to $\frac{4}{a}$ (b) $\frac{2}{1}$ (c) $\frac{1}{a}$ (d) $\frac{1}{4a}$

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**742.** Let $S$ be the focus of $y^2 = 4x$ and a point $P$ be moving on the curve such that its abscissa is increasing at the rate of 4 units/s. Then the rate of increase of the projection of $SP$ on $x + y = 1$ when $P$ is at (4, 4) is (a)$\sqrt{2}$ (b) $-1$ (c) $-\sqrt{2}$ (d) $-\dfrac{3}{\sqrt{2}}$

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**743.** If $a \neq 0$ and the line $2bx + 3cy + 4d = 0$ passes through the points of intersection of the parabolas $y^2 = 4ax$ and $x^2 = 4ay$, then (a) $d^2 + (2b + 3c)^2 = 0$ (b)$d^2 + (3b + 2c)^2 = 0$ (c)$d^2 + (2b - 3c)^2 = 0$ (d)none of these

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**744.** If $y_1, y_2, y_3$ be the ordinates of a vertices of the triangle inscribed in a parabola $y^2 = 4ax$, then show that the area of the triangle is $\dfrac{1}{8a}\left|\left(y_1 - y_2\right)\left(y_2 - y_3\right)\left(y_3 - y_1\right)\right|$.

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**745.** The circle $x^2 + y^2 + 2\lambda x = 0, \lambda \in R$, touches the parabola $y^2 = 4x$ externally. Then, (a)$\lambda > 0$ (b) $\lambda < 0$ (c)$\lambda > 1$ (d) none of these

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**746.** If $PSQ$ is a focal chord of the parabola $y^2 = 8x$ such that $SP = 6$, then the length of $SQ$ is (a)6 (b) 4 (c) 3 (d) none of these

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**747.** Parabola $y^2 = 4a\left(x - c_1\right)$ and $x^2 = 4a\left(y - c_2\right)$, where $c_1 and c_2$ are variable, are such that they touch each other. The locus of their point of contact is (a)$xy = 2a^2$ (b) $xy = 4a^2$ (c)$xy = a^2$ (d) none of these

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**748.** A circle touches the x-axis and also thouches the circle with center (0, 3) and radius 2. The locus of the center of the circle is (a)a circle (b) an ellipse (c)a parabola (d) a hyperbola

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**749.** The locus of the vertex of the family of parabolas

$$y = \frac{a^3x^2}{3} + \frac{a^2x}{2} - 2a \text{ is}$$

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**750.** Let $P$ be the point (1, 0) and $Q$ be a point on the locus $y^2 = 8x$ . The locus of the midpoint of $PQ$ is (a) $y^2 + 4x + 2 = 0$ (b) $y^2 - 4x + 2 = 0$ (c) $x^2 - 4y + 2 = 0$ (d) $x^2 + 4y + 2 = 0$

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**751.** If the line$y - \sqrt{3}x + 3 = 0$ cuts the parabola $y^2 = x + 2$ at A and B, then find the value of PA.PB(where $P = \left(\sqrt{3}, 0\right)$

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**752.** The locus of a point on the variable parabola $y^2 = 4ax,$ whose distance from the focus is always equal to $k,$ is equal to ($a$ is parameter) (a)$4x^2 + y^2 - 4kx = 0$ (b)$x^2 + y^2 - 4kx = 0$ (c)$2x^2 + 4y^2 - 9kx = 0$ (d) $4x^2 - y^2 + 4kx = 0$

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**753.** Tangent to the curve $y = x^2 + 6$ at a point $(1, 7)$ touches the circle $x^2 + y^2 + 16x + 12y + c = 0$at a point $Q$, then the coordinates of $Q$ are (A) $( - 6, - 11)$ (B) $( - 9, - 13)$ (C) $( - 10, - 15)$ (D) $( - 6, - 7)$

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**754.** The angle between the tangents drawn from the point (1, 4) to the parabola $y^2 = 4x$ is (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

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**755.** Statement 1: There are no common tangents between the circle $x^2 + y^2 - 4x + 3 = 0$ and the parabola $y^2 = 2x$ Statement 2:Given circle and parabola do not intersect.

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**756.** If the line $x - 1 = 0$ is the directrix of the parabola $y^2 - kx + 8 = 0$, then one of the values of $k$ is $\frac{1}{8}$ (b) 8 (c) 4 (d) $\frac{1}{4}$

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**757.** C is the centre of the circle with centre $(0, 1)$ and radius unity. $y = ax^2$ is a parabola. The set of the values of $'a'$ for which they meet at a point other than the origin, is

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**758.** Find the shortest distance between the parabolas $2y^2 = 2x - 1$ and $2x^2 = 2y - 1$.

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**759.** Normals at two points $(x_1, y_1)$ and $(x_2, y_2)$ of the parabola $y^2 = 4x$ meet again on the parabola, where $x_1 + x_2 = 4$. Then $|y_1 + y_2|$ is equal to

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**760.** The endpoints of two normal chords of a parabola are concyclic. Then the tangents at the feet of the normals will intersect

A. (a) at tangent at vertex of the parabola

B. (b) axis of the parabola

C. (c) directrix of the parabola

D. (d) none of these

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**761.** From the point (15, 12), three normals are drawn to the parabola $y^2 = 4x$ . Then centroid and triangle formed by three co-normals points is

(A) $\left(\frac{16}{3}, 0\right)$ (B) $(4, 0)$ (C) $\left(\frac{26}{3}, 0\right)$ (D) $(6, 0)$

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**762.** t 1 and t 2 are two points on the parabola $y^2 = 4ax$ . If the focal chord joining them coincides with the normal chord, then $(a)t1(t1 + t2) + 2 = 0(b)$ t1+t2=0 $(c)t1 \cdot t2 = -1$ (d) none of these

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**763.** Tangent and normal are drawn at the point $P \equiv (16, 16)$ of the parabola $y^2 = 16x$ which cut the axis of the parabola at the points $AandB$ , rerspectively. If the center of the circle through $P, A, andB$ is $C$ , then the angle between $PC$ and the axis of $x$ is $(a)\tan^{-1}\left(\frac{1}{2}\right)$ (b) $\tan^{-1}2$ $(c)\tan^{-1}\left(\frac{3}{4}\right)$ (d) $\tan^{-1}\left(\frac{4}{3}\right)$

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**764.** Length of the shortest normal chord of the parabola $y^2 = 4ax$ is

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**765.** The line $x - y - 1 = 0$ meets the parabola $y^2 = 4x$ at A and B. Normals at A and B meet at C. If D CD is normal at D, then the co-ordinates of D are

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**766.** If normal are drawn from a point $P(h, k)$ to the parabola $y^2 = 4ax$, then the sum of the intercepts which the normals cut-off from the axis of the parabola is

A. (a) $(h + c)$

B. (b) $3(h + a)$

C. (c)$2(h + a)$

D. (d) none of these

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**767.** If $x + y = k$ is normal to $y^2 = 12x$, then $k$ is 3 (b) 9 (c) -9 (d) -3

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**768.** An equilateral triangle $SAB$ is inscribed in the parabola $y^2 = 4ax$ having its focus at $S$ If chord $AB$ lies towards the left of $S$, then the side length of this triangle is (a)$2a\left(2 - \sqrt{3}\right)$ (b) $4a\left(2 - \sqrt{3}\right)$ (c)$a\left(2 - \sqrt{3}\right)$ (d) $8a\left(2 - \sqrt{3}\right)$

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**769.** $\min\left[\left(x_1 - x_2\right)^2 + \left(3 + \sqrt{1 - x_1^2} - \sqrt{4x_2}\right)^2\right], \forall x_1, x_2 \in R,$ is (a) $4\sqrt{5} + 1$ (b) $3 - 2\sqrt{2}$ (c)$\sqrt{5} + 1$ (d) $\sqrt{5} - 1$

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**770.** The equation of the directrix of the parabola $y^2 + 4y + 4x + 2 = 0$ is

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**771.** The equation of the common tangent touching the circle $(x-3)^2+y^2=9$ and the parabola $y^2=4x$ above the x-axis is (a) $\sqrt{3}y=3x+1$ (b) $\sqrt{3}y=-(x+3)$ (C)$\sqrt{3}y=x+3$ (d) $\sqrt{3}y=-(3x-1)$

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**772.** At what point on the parabola $y^2=4x$ the normal makes equal angle with the axes? (A) $(4, 4)$ (B) $(9, 6)$ (C) $(4, -4)$ (D) $(1, \pm 2)$

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**773.** The focal chord to $y^2=16x$ is tangent to $(x-6)^2+y^2=2.$ Then the possible value of the slope of this chord is (a)$\{-1, 1\}$ (b) $\{-2, 2\}$ (c) $\left\{-2, \frac{1}{2}\right\}$ (d) $\left\{2, -\frac{1}{2}\right\}$

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**774.** The locus of the midpoint of the segment joining the focus to a moving point on the parabola $y^2 = 4ax$ is another parabola with directrix (a)$y = 0$ (b) $x = -a$ (c)$x = 0$ (d) none of these

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**775.** The curve described parametrically by $x = t^2 + t + 1$ , and $y = t^2 - t + 1$ represents. (a)a pair of straight lines (b) an ellipse (c)a parabola (d) a hyperbola

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**776.** Statement 1: The line $y = x + 2a$ touches the parabola $y^2 = 4a(x + a)$ Statement 2: The line $y = mx + am + \frac{a}{m}$ touches $y^2 = 4a(x + a)$ for all real values of $m$.

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**777.** Consider a circle with its centre lying on the focus of the parabola, $y^2 = 2px$ such that it touches the directrix of the parabola. Then a point of intersection of the circle & the parabola is:

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**778.** Normal drawn to $y^2 = 4ax$ at the points where it is intersected by the line $y = mx + c$ intersect at $P$ . The foot of the another normal drawn to the parabola from the point $P$ is (a) $\left(\frac{a}{m^2}, -\frac{2a}{m}\right)$ (b) $\left(\frac{9a}{m}, -\frac{6a}{m}\right)$ (c) $\left(am^2, -2am\right)$ (d) $\left(\frac{4a}{m^2}, -\frac{4a}{m}\right)$

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**779.** The radius of the circle touching the parabola $y^2 = x$ at (1, 1) and having the directrix of $y^2 = x$ as its normal is $(a)\frac{5\sqrt{5}}{8}$ (b) $\frac{10\sqrt{5}}{3}$ $(c)\frac{5\sqrt{5}}{4}$ (d) none of these

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**780.** Maximum number of common normals of $y^2 = 4ax$ and $x^2 = 4by$ is

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**781.** If two different tangents of $y^2 = 4x$ are the normals to $x^2 = 4by$, then

(a)$|b| > \frac{1}{2\sqrt{2}}$ (b) $|b| < \frac{1}{2\sqrt{2}}$ (c)$|b| > \frac{1}{\sqrt{2}}$ (d) $|b| < \frac{1}{\sqrt{2}}$

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**782.** The largest value of $a$ for which the circle $x^2 + y^2 = a^2$ falls totally in the interior of the parabola $y^2 = 4(x + 4)$ is (a)$4\sqrt{3}$ (b) 4 (c) $4\frac{\sqrt{6}}{7}$ (d) $2\sqrt{3}$

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**783.** A ray of light travels along a line $y = 4$ and strikes the surface of curves $y^2 = 4(x + y)$ . Then the equations of the line along which of reflected ray travels is $x = 0$ (b) $x = 2$ (c) $x + y$ (d) $2x + y = 4$

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**784.** A set of parallel chords of the parabola $y^2 = 4ax$ have their midpoint on (a)any straight line through the vertex (b)any straight line through the focus (c)a straight line parallel to the axis (d)another parabola

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**785.** A line L passing through the focus of the parabola $y^2 = 4(x - 1)$ intersects the parabola at two distinct point,

If m is the slope of the line L, then

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**786.** The ration in which the line segement joining the points $(4, -6)$ and $(3, 1)$ is divided by the parabola $y^2 = 4x$ is (a) $\frac{-20 \pm \sqrt{155}}{11} : 1$ (b) $\frac{-20 \pm \sqrt{155}}{11} : 2$ (c) $-20 \pm 2\sqrt{155} : 11$ (d) $-20 \pm \sqrt{155} : 11$

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**787.** If $(a, b)$ is the midpoint of a chord passing through the vertex of the parabola $y^2 = 4x$, then $a = 2b$ (b) $a^2 = 2b$ $a^2 = 2b$ (d) $2a = b^2$

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**788.** A water jet from a fountain reaches its 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

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**789.** The vertex of the parabola whose parametric equation is $x = t^2 - t + 1, y = t^2 + t + 1; t \in R,$ is (1, 1) (b) (2, 2) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (d) $(3, 3)$

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**790.** A point $P(x, y)$ moves in the xy-plane such that $x = a\cos^2\theta$ and $y = 2a\sin\theta,$ where $\theta$ is a parameter. The locus of the point $P$ is a/an (A) circle (B) ellipse (C) unbounded parabola (D) part of the parabola

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**791.** The locus of the point $\left(\sqrt{3h}, \left(\sqrt{3}k + 2\right)\right)$ if it lies on the line $x - y - 1 = 0$ is straight line (b) a circle a parabola (d) none of these

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**792.** If the segment intercepted by the parabola $y^2 = 4ax$ with the line $lx + my + n = 0$ subtends a right angle at the vertex, then

A. (a)4a l+n=0`

B. (b) $4al + 4am + n = 0$

C. (c)$4am + n = 0$

D. (d) $al + n = 0$

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**793.** The graph of the curve $x^2 + y^2 - 2xy - 8x - 8y + 32 = 0$ falls wholly in the (a)first quadrant (b) second quadrant (c)third quadrant (d) none of these

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**794.** Consider two curves $C1: y^2 = 4x; C2 = x^2 + y^2 - 6x + 1 = 0$. Then, a. C1 and C2 touch each other at one point b. C1 and C2 touch each other exactly at two point c. C1 and C2 intersect(but do not touch) at exactly two point d. C1 and C2 neither intersect nor touch each other

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**795.** Let the curve C be the mirror image of the parabola $y^2 = 4x$ with respect to the line $x + y + 4 = 0$. If A and B are the points of intersection of C with the line $y = -5$, then the distance between A and B is

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**796.** Let S be the focus of the parabola $y^2 = 8x$ and let PQ be the common chord of the circle $x^2 + y^2 - 2x - 4y = 0$ and the given parabola. The area of the triangle PQS is -

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**797.** Consider the parabola $y^2 = 8x$. Let $\Delta_1$ be the area of the triangle formed by the end points of its latus rectum and the point P($\frac{1}{2}$,2) on the parabola and $\Delta_2$ be the area of the triangle formed by drawing tangents at P and at the end points of latus rectum. $\frac{\Delta_1}{\Delta_2}$ is :

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**798.** A line L:y=mx+3 meets y-axis at E(0,3) and the arc of the parabola y 2 =16x,0≤y≤6 at the point F(x 0 ,y 0 ). The tangent to the parabola at F(x 0 ,y 0 ) intersects the y-axis at G(0,y 1 ). The slope m of the line L is chosen such that the area of the △EFG has a local maximum. Match List 1 with List 2 List 1 List 2 A. m= 1. 2 1 B. Maximum area of ΔEFG is 2. 4 C. y 0 = 3. 2 D. y 1 = 4. 1

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**799.** Normals are drawn at point P,Q,R lying on parabola y 2 =4x which intersect at (3,0) then area of △PQR is :-

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**800.** Tangents and normal drawn to the parabola $y^2 = 4ax$ at point $P\left(at^2, 2at\right), t \neq 0,$ meet the x-axis at point $TandN,$ respectively. If $S$ is the focus of theparabola, then (a)$SP = ST \neq SN$ (b) $SP \neq ST = SN$ (c) $SP = ST = SN$ (d) $SP \neq ST \neq SN$

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**801.** If the normals to the parabola $y^2 = 4ax$ at three points $\left(ap^2, 2ap\right)$, and $\left(aq^2, 2aq\right)$ are concurrent, then the common root of equations $Px^2 + qx + r = 0$ and $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ is (a)$p$ (b) $q$ (c) $r$ (d) $1$

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**802.** Normals $AO$, $\forall_1 and \forall_2$ are drawn to the parabola $y^2 = 8x$ from the point $A(h, 0)$ . If triangle $OA_1A_2$ is equilateral then the possible value of $h$ is 26 (b) 24 (c) 28 (d) none of these

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**803.** If $2x + y + \lambda = 0$ is a normal to the parabola $y^2 = -8x$, then $\lambda$ is 12 (b) -12 (c) 24 (d) -24

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**804.** The length of the latus rectum of the parabola whose focus is $\left(\frac{u^2}{2g}\sin 2\alpha, -\frac{u^2}{2g}\cos 2\alpha\right)$ and directrix is $y = \frac{u^2}{2g}$ is (a) $\frac{u^2}{g}\cos^2\alpha$ (b) $\frac{u^2}{g}\cos^2 2\alpha$ (c) $\frac{2u^2}{g}\cos^2 2\alpha$ (d) $\frac{2u^2}{g}\cos^2\alpha$

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**805.** If parabolas $y^2 = \lambda x$ and $25\left[(x-3)^2 + (y+2)^2\right] = (3x - 4y - 2)^2$ are equal, then the value of $\lambda$ is (a)9 (b) 3 (c) 7 (d) 6

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**806.** The normal at the point $P\left(ap^2, 2ap\right)$ meets the parabola $y^2 = 4ax$ again at $Q\left(aq^2, 2aq\right)$ such that the lines joining the origin to P and Q are at right angle. Then (A) $p^2 = 2$ (B) $q^2 = 2$ (C) $p = 2q$ (D) $q = 2p$

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**807.** The set of points on the axis of the parabola $y^2 = 4x + 8$ from which the three normals to the parabola are all real and different is (a) $\{(k, 0) | k \le -2\}$ (b) $\{(k, 0) | k \ge -2\}$ (c) $\{(0, k) | k \ge -2\}$ (d) none of these

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**808.** Which one of the following equation represent parametric equation to a parabolic curve? (a) $x = 3\cos t; y = 4\sin t$ (b) $x^2 - 2 = 2\cos t; y = 4\frac{\cos^2 t}{2}$ (c) $\sqrt{x} = \tan t; \sqrt{y} = \sec t$ (d) $x = \sqrt{1 - \sin t}; y = \frac{\sin t}{2} + \frac{\cos t}{2}$

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**809.** The vertex of a parabola is the point $(a, b)$ and the latus rectum is of length $l$. If the axis of the parabola is parallel to the y-axis and the parabola is concave upward, then its equation is (a) $(x + a)^2 = \frac{l}{2}(2y - 2b)$ (b) $(x - a)^2 = \frac{l}{2}(2y - 2b)$ (c) $(x + a)^2 = \frac{l}{4}(2y - 2b)$ (d) $(x - a)^2 = \frac{l}{8}(2y - 2b)$

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**810.** The curve represented by the equation $\sqrt{px} + \sqrt{qy} = 1$ where $p, q \in R, p, q > 0,$ is a circle (b) a parabola an ellipse (d) a hyperbola

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**811.** Prove that the equation of the parabola whose focus is (0, 0) and tangent at the vertex is $x - y + 1 = 0$is $x^2 + y^2 + 2xy - 4x + 4y - 4 = 0.$

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**812.** A parabola is drawn touching the axis of x at the origin and having its vertex at a given distance k form this axis Prove that the axis of the parabola is a tangent to the parabola $x^2 = -8k(y - 2k)$.

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**813.** A series of chords are drawn so that their projections on the straight line, which is inclined at an angle $a$ to the axis, are of constant length $\cdot$ Prove that the locus of their middle point is the curve. $\left(y^2 - 4ax\right)(y\cos\alpha + 2a\sin\alpha)^2 + a^2c^2 = 0.$

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**814.** 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 (a) $y^2 - 4\left(a_1 - a\right)x$ (b) $y^2 - 4\left(a_1 - a\right)(x - a)$ (c) $y^2 - 4\left(a - a_1\right)(x - a)$ (d) none of these

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**815.** prove that for a suitable point $P$ on the axis of the parabola, chord $AB$ through the point $P$ can be drawn such that $\left[\left(\frac{1}{AP^2}\right) + \left(\frac{1}{BP^2}\right)\right]$ is same for all positions of the chord.

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**816.** Two parabola have the same focus. If their directrices are the x-axis and the y-axis respectively, then the slope of their common chord is :

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**817.** The number of common chords of the parabolas $x = y^2 - 6y + 11$ and $y = x^2 - 6x + 11$ is 1 (b) 2 (c) 4 (d) 6

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**818.** Find the equation of the curve whose parametric equation are $x = 1 + 4\cos\theta, y = 2 + 3\sin\theta, \theta \in R$.

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**819.** Prove that any point on the ellipse whose foci are $(-1, 0)$ and $(7, 0)$ and eccentricity is $\frac{1}{2}$ is $\left(3 + 8\cos\theta, 4\sqrt{3}\sin\theta\right), \theta \in R$.

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**820.** Find the eccentric angle of a point on the ellipse $\frac{x^2}{6} + \frac{y^2}{2} = 1$ whose distance from the center of the ellipse is $\sqrt{5}$

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

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**822.** The auxiliary circle of a family of ellipses passes through the origin and makes intercepts of 8 units and 6 units on the x and y-axis, respectively. If the eccentricity of all such ellipses is $\frac{1}{2}$, then find the locus of the focus.

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**823.** Find the number of rational points on the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1.$

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**824.** A line passing through the origin $O(0, 0)$ intersects two concentric circles of radii $a and b$ at $P and Q$, If the lines parallel to the X-and Y-axes through $Q and P$, respectively, meet at point $R$, then find the locus of $R$.

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**825.** If the line $lx + my + n = 0$ cuts the ellipse $\left(\frac{x^2}{a^2}\right) + \left(\frac{y^2}{b^2}\right) = 1$ at points whose eccentric angles differ by $\frac{\pi}{2}$, then find the value of $\frac{a^2l^2 + b^2m^2}{n^2}$.

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**826.** Find the area of the greatest isosceles triangle that can be inscribed in the ellipse $\left(\frac{x^2}{a^2}\right) + \left(\frac{y^2}{b^2}\right) = 1$ having its vertex coincident with one extremity of the major axis.

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**827.** Find the eccentric angles of the extremities of the latus recta of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

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**828.** Find the equation of the ellipse whose axes are of length 6 and $2\sqrt{6}$ and their equations are $x - 3y + 3 = 0$ and $3x + y - 1 = 0$, respectively.

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**829.** If the equation $(5x - 1)^2 + (5y - 2)^2 = \left(\lambda^2 - 2\lambda + 1\right)(3x + 4y - 1)^2$ represents an ellipse, then find values of $\dot{\lambda}$

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**830.** Find the equation to the ellipse, whose focus is the point $(-1, 1)$, whose directrix is the straight line $x - y + 3 = 0$, and whose eccentricity is

$\frac{1}{2}$.

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**831.** The moon travels an elliptical path with Earth as one focus. The maximum distance from the moon to the earth is 405, 500 km and the minimum distance is 363,300 km. What is the eccentricity of the orbit?

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**832.** If the foci of an ellipse are $(0, \pm 1)$ and the minor axis is of unit length, then find the equation of the ellipse. The axes of ellipse are the coordinate axes.

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**833.** Let $P$ be a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ of eccentricity $e$. If $A, A'$ are the vertices and $S, S$ are the foci of the ellipse, then find the ratio area

$PSS''$ : area $APA'$

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**834.** The vertices of the hyperbola $9x^2 - 16y^2 = 144$

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

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**836.** Find the lengths of the major and minor axes and the eccentricity of the ellipse $\frac{(3x - 4y + 2)^2}{16} + \frac{(4x + 3y - 5)^2}{9} = 1$

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**837.** Find the eccentricity, one of the foci, the directrix, and the length of the latus rectum for the conic $(3x - 12)^2 + (3y + 15)^2 = \frac{(3x - 4y + 5)^2}{25}$.

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**838.** An ellipse passes through the point $(4, -1)$ and touches the line $x + 4y - 10 = 0$. Find its equation if its axes coincide with the coordinate axes.

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**839.** Find the point on the ellipse $16x^2 + 11y^2 = 256$ where the common tangent to it and the circle $x^2 + y^2 - 2x = 15$ touch.

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**840.** If $\frac{x}{a} + \frac{y}{b} = \sqrt{2}$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then find the eccentric angle $\theta$ of point of contact.

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**841.** Find the points on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ such that the tangent at each point makes equal angles with the axes.

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**842.** An ellipse slides between two perpendicular straight lines. Then identify the locus of its center.

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**843.** Find the locus of he foot fo the perpendicular draw from the centre upon any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

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**844.** Find the maximum area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ which touches the line $y = 3x + 2$.

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**845.** A tangent is drawn to the ellipse $\frac{x^2}{27} + y^2 = 1$ at $(3\sqrt{3}\cos\theta, \sin\theta)$ where $\theta \varepsilon \left(0, \frac{\pi}{2}\right)$. Then find the value of $\theta$ such that the sum of intercepts on the axes made by this tangent is minimum.

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**846.** Consider an ellipse $\frac{x^2}{4} + y^2 = \alpha(\alpha$ is parameter $> 0)$ and a parabola $y^2 = 8x$ . If a common tangent to the ellipse and the parabola meets the coordinate axes at $A and B$ , respectively, then find the locus of the midpoint of $AB$.

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**847.** Find the angle between the pair of tangents from the point (1,2) to the ellipse $3x^2 + 2y^2 = 5$.

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**848.** If the chord joining points $P(\alpha) and Q(\beta)$ on the ellipse $\left(\frac{x^2}{a^2}\right) + \left(\frac{y^2}{b^2}\right) = 1$ subtends a right angle at the vertex $A(a, 0)$, then prove that $\tan\left(\frac{\alpha}{2}\right)\tan\left(\frac{\beta}{2}\right) = -\frac{b^2}{a^2}.$

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**849.** If $\alpha and \beta$ are the eccentric angles of the extremities of a focal chord of an ellipse, then prove that the eccentricity of the ellipse is $\frac{\sin\alpha + \sin\beta}{\sin(\alpha + \beta)}$

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**850.** Find the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$

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**851.** The center of an ellipse is $C$ and $PN$ is any ordinate. Point $A, A'$ are the endpoints of the major axis. Then find the value of $\frac{PN^2}{(AN).A'N}$

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**852.** The ratio of the area of triangle inscribed in ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ to that of triangle formed by the corresponding points on the auxiliary circle is 0.5. Then, find the eccentricity of the ellipse.

A. (A) $\frac{1}{2}$

B. (B) `sqrt3/2

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

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

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**853.** If $PSQ$ is a focal chord of the ellipse $16x^2 + 25y^2 = 400$ such that $SP = 8,$ then find the length of $SQ.$ is (a) 1 (b) 2 (c) 3 (d) 4

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**854.** $AOB$ is the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in which $OA = a, OB = b$. Then find the area between the arc $AB$ and the chord $AB$ of the ellipse.

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**855.** If $SandS'$ are two foci of ellipse $16x^2 + 25y^2 = 400andPSQ$ is a focal chord such that $SP = 16,$ then find $S'Q^{.}$

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**856.** Findt he equatins of the tangents drawn from the point (2,3) to the ellipe $9x^2 + 16y^2 = 144$

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**857.** Prove that the area bounded by the circle $x^2 + y^2 = a^2$ and the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is equal to the area of another ellipse having semi-axis $a - b$ and $a, a > b$ .

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**858.** If the normal at $P\left(2, \frac{3\sqrt{3}}{2}\right)$ meets the major axis of ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ at $Q$ , and $S$ and $S'$ are the foci of the given ellipse, then find the ratio $SQ:S'Q$

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**859.** Normal to the ellipse $\frac{x^2}{64} + \frac{y^2}{49} = 1$ intersects the major and minor axes at $PandQ$, respectively. Find the locus of the point dividing segment $PQ$ in the ratio 2:1.

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**860.** The line $lx + my + n = 0$ is a normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . then prove that $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{\left(a^2 - b^2\right)^2}{n^2}$

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**861.** Find the equation of the normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the positive end of the latus rectum.

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**862.** Find the points on the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ on which the normals are parallel to the line $2x - y = 1$.

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**863.** If $\omega$ is one of the angles between the normals to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1' atthep\oint whoseeentric\angle saret$heta and pi/2+theta, $thenprovet$ (2cotomega)/(sin2theta)=(e^2)/(sqrt(1-e^2))`

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**864.** If the normal at any point $P$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ meets the axes at $G$ and $g$ respectively, then find the raio $PG : Pg =$ (a) $a : b$ (b) $a^2 : b^2$ (c) $b : a$ (d) $b^2 : a^2$

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**865.** P is the point on the ellipse is $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and $Q$ is the corresponding point on the auxiliary circle of the ellipse. If the line joining the center C to Q meets the normal at P with respect to the given ellipse at K, then find the value of CK.

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**866.** If the normal at one end of the latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ passes through one end of the minor axis, then prove that eccentricity is constant.

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**867.** If the normals to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the points $(X_1, y_1), (x_2, y_2)$ and $(x_3, y_3)$ are concurrent, prove that

$$\begin{vmatrix} x_1 & y_1 & x_1y_1 \\ x_2 & y_2 & x_2y_2 \\ x_3 & y_3 & x_3y_3 \end{vmatrix} = 0.$$

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**868.** Find the normal to the ellipse $\frac{x^2}{18} + \frac{y^2}{8} = 1$ at point (3, 2).

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**869.** If two points are taken on the minor axis of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the same distance from the center as the foci, then prove that the sum of the squares of the perpendicular distances from these points on any tangent to the ellipse is $2a^2$.

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**870.** If any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ intercepts equal lengths $l$ on the axes, then find $\dot{l}$

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**871.** Find the slope of a common tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and a concentric circle of radius $\dot{r}$

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**872.** If the straight line $x\cos\alpha + y\sin\alpha = p$ touches the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then prove that $a^2\cos^2\alpha + b^2\sin^2\alpha = \dot{p^2}$

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**873.** If $F_1$ and $F_2$ are the feet of the perpendiculars from the foci $S_1 and S_2$ of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ on the tangent at any point $P$ on the ellipse, then prove that $S_1F_1 + S_2F_2 \geq 8$.

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**874.** If the tangent at any point of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ makes an angle $\alpha$ with the major axis and an angle $\beta$ with the focal radius of the point of contact, then show that the eccentricity of the ellipse is given by $e = \frac{\cos\beta}{\cos\alpha}$

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**875.** Two perpendicular tangents drawn to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ intersect on the curve.

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**876.** A tangent having slope of $-\frac{4}{3}$ to the ellipse $\frac{x^2}{18} + \frac{y^2}{32} = 1$ intersects the major and minor axes at points $AandB$, respectively. If $C$ is the center of the ellipse, then find area of triangle $ABC$.

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**877.** If the tangent to the ellipse $x^2 + 2y^2 = 1$ at point $P\left(\frac{1}{\sqrt{2}}, \frac{1}{2}\right)$ meets the auxiliary circle at point $RandQ$ , then find the points of intersection of tangents to the circle at $QandR$.

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**878.** Chords of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are drawn through the positive end of the minor axis. Then prove that their midpoints lie on the ellipse.

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**879.** Find the locus of the middle points of all chords of $\frac{x^2}{4} + \frac{y^2}{9} = 1$ which are at a distance of 2 units from the vertex of parabola $y^2 = -8ax$.

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**880.** Tangents $PQandPR$ are drawn at the extremities of the chord of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ , which get bisected at point $T(1, 1)$. Then find the point of intersection of the tangents.

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**881.** If the chords of contact of tangents from two poinst $(x_1, y_1)$ and $(x_2, y_2)$ to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are at right angles, then find the value of $\frac{x_1x_2}{y_1y_2}$.

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**882.** From the point $A(4, 3)$, tangent are drawn to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ to touch the ellipse at $B$ and $CEF$ is a tangent to the ellipse parallel to line $BC$ and towards point $A$. Then find the distance of $A$ from $EF$.

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**883.** The foci of the ellipse

$25(x + 1)^2 + 9(y + 2)^2 = 225$

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**884.** Find the equation of an ellipse whose axes are the x-and y-axis and whose one focus is at (4,0) and eccentricity is 4/5.

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**885.** If $P(\alpha, \beta)$ is a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with foci $SandS'$ and eccentricity $e$, then prove that the area of $SPS'$ is $ba\sqrt{a^2 - \alpha^2}$

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**886.** An arc of a bridge is semi-elliptical with the major axis horizontal. If the length of the base is 9m and the highest part of the bridge is 3m from the horizontal, then prove that the best approximation of the height of the acr 2 m from the center of the base is $\frac{8}{3}m^{\cdot}$

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**887.** 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 :

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**888.** $P$ is a variable on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with AA' as the major axis.

Find the maximum area of triangle $APA'$

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**889.** Prove that the curve represented by

$x = 3(\cos t + \sin t), y = 4(\cos t - \sin t), t \in R,$ is an ellipse

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**890.** Find the center, foci, the length of the axes, and the eccentricity of

the ellipse $2x^2 + 3y^2 - 4x - 12y + 13 = 0$

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**891.** If $C$ is the center and $A, B$ are two points on the conic

$4x^2 + 9y^2 - 8x - 36y + 4 = 0$ such that $\angle ACB = \frac{\pi}{2}$, then prove that

$$\frac{1}{CA^2}+\frac{1}{CB^2}=\frac{13}{36}\cdot$$

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**892.** Find the equation of a chord of the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ joining two points $P\left(\frac{\pi}{4}\right)$ and $Q\left(\frac{5\pi}{4}\right)$

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**893.** Prove that the chords of contact of pairs of perpendicular tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ touch another fixed ellipse.

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**894.** Tangents are drawn from the point (3,2) to the ellipse $x^2+4y^2=9$. Find the equation to their chord of contact and the middle poin of the chord of contacnt.

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**895.** Find the locus of the point of intersection of tangents to the ellipse if the difference of the eccentric angle of the points is $\frac{2\pi}{3}\cdot$

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**896.** Tangents are drawn from the points on the line $x - y - 5 = 0$ to $x^2 + 4y^2 = 4$ . Then all the chords of contact pass through a fixed point. Find the coordinates.

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**897.** If from a point $P$, tangents $PQandPR$ are drawn to the ellipse $\frac{x^2}{2} + y^2 = 1$ so that the equation of $QR$ is $x + 3y = 1$, then find the coordinates of $P^{\cdot}$

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**898.** Prove that the chord of contact of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with respect to any point on the directrix is a focal chord.

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**899.** Find the locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = ax + \beta$ is a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.

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**900.** The locus of the point which is such that the chord of contact of tangents drawn from it to the ellipse $\frac{x^2}{A^2} + \frac{y^2}{b^2} = 1$ forms a triangle of constant area with the coordinate axes is

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**901.** A point $P$ moves such that the chord of contact of the pair of tangents from $P$ on the parabola $y^2 = 4ax$ touches the rectangular hyperbola $x^2 - y^2 = c^2$. Show that the locus of $P$ is the ellipse $\frac{x^2}{c^2} + \frac{y^2}{(2a)^2} = 1.$

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**902.** Find the length of the chord of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ Whose midpoint is (1/2, 2/5)

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**903.** Find the equation of the chord of the hyperbola $25x^2 - 16y^2 = 400$ which is bisected at the point (5, 3).

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**904.** The locus of the point which divides the double ordinates of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in the ratio $1:2$ internally is $\frac{x^2}{a^2} + \frac{9y^2}{b^2} = 1$ (b) $\frac{x^2}{a^2} + \frac{9y^2}{b^2} = \frac{1}{9}$ $\frac{9x^2}{a^2} + \frac{9y^2}{b^2} = 1$ (d) none of these

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**905.** Find the locus of the middle points of chord of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ which are drawn through the positive end of the minor axis.

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**906.** Find the point on the hyperbola $x^2 - 9y^2 = 9$ where the line $5x + 12y = 9$ touches it.

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**907.** If (5, 12) and (24, 7) are the foci of an ellipse passing through the origin, then find the eccentricity of the ellipse.

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**908.** From any point $P$ lying in the first quadrant on the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, $PN$ is drawn perpendicular to the major axis and produced at $Q$ so that $NQ$ equals to $PS$, where $S$ is a focus. Then the locus of $Q$ is

(a) $5y - 3x - 25 = 0$ (b) $3x + 5y + 25 = 0$ (c)$3x - 5y - 25 = 0$ (d) none of these

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**909.** If any line perpendicular to the transverse axis cuts the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and the conjugate hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ at points $PandQ$, respectively, then prove that normal at $PandQ$ meet on the x-axis.

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**910.** If the focal distance of an end of the minor axis of an ellipse (referred to its axes as the axes of $xandy$ , respectively) is $k$ and the distance between its foci is $2h$, them find its equation.

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**911.** Tangents are drawn to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a > b)$, and the circle $x^2 + y^2 = a^2$ at the points where a common ordinate cuts them (on the same side of the x-axis). Then the greatest acute angle between these tangents is given by (A) $\tan^{-1}\left(\frac{a-b}{2\sqrt{ab}}\right)$ (B) $\tan^{-1}\left(\frac{a+b}{2\sqrt{ab}}\right)$ (C) $\tan^{-1}\left(\frac{2ab}{\sqrt{a-b}}\right)$

(D) $\tan^{-1}\left(\frac{2ab}{\sqrt{a+b}}\right)$

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**912.** A normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ meets the axes in M and N and lines MP and NP are drawn perpendicular to the axes meeting at P.

Prove that the locus of P is the hyperbola $a^2x^2 - b^2y^2 = \left(a^2 + b^2\right)^2$

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**913.** Find the eccentricity of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ whose latus rectum is half of its major axis. $(a > b)$

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**914.** The slopes of the common tanents of the ellipse $\frac{x^2}{4} + \frac{y^2}{1} = 1$ and the circle $x^2 + y^2 = 3$ are (a)$\pm 1$ (b) $\pm\sqrt{2}$ (c) $\pm\sqrt{3}$ (d) none of these

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**915.** The locus of the midde points ofchords of hyperbola $3x^2 - 2y^2 + 4x - 6y = 0$ parallel to $y = 2x$ is

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**916.** The coordinates of the vertices $BandC$ of a triangle $ABC$ are (2, 0) and (8, 0), respectively. Vertex $A$ is moving in such a way that $4\frac{\tan B}{2}\frac{\tan C}{2} = 1.$ Then find the locus of $A$

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**917.** If the tangents to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ make angles $\alpha and \beta$ with the major axis such that $\tan\alpha + \tan\beta = \gamma,$ then the locus of their point of intersection is (a)$x^2 + y^2 = a^2$ (b) $x^2 + y^2 = b^2$ (c)$x^2 - a^2 = 2\lambda xy$ (d) $\lambda\left(x^2 - a^2\right) = 2xy$

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**918.** 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

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**919.** Find the condition on $a and b$ for which two distinct chords of the hyperbola $\frac{x^2}{2a^2} - \frac{y^2}{2b^2} = 1$ passing through $(a, b)$ are bisected by the line $x + y = b$.

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**920.** The point of intersection of the tangents at the point $P$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and its corresponding point $Q$ on the auxiliary circle meet on the line (a) $x = \frac{a}{e}$ (b) $x = 0$ (c) $y = 0$ (d) none of these

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**921.** Find the equation of the ellipse (referred to its axes as the axes of $x and y$, respectively) whose foci are $(\pm 2, 0)$ and eccentricity is $\frac{1}{2}$

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**922.** The sum of the squares of the perpendiculars on any tangents to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ from two points on the minor axis each at a distance $ae$ from the center is $2a^2$ (b) $2b^2$ (c) $a^2 + b^2$ $a^2 - b^2$

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**923.** 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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**924.** If $\alpha - \beta =$ constant, then the locus of the point of intersection of tangents at $P(a\cos\alpha, b\sin\alpha)$ and $Q(a\cos\beta, b\sin\beta)$ to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is: (a) a circle (b) a straight line (c) an ellipse (d) a parabola

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**925.** Two circles are given such that one is completely lying inside the other without touching. Prove that the locus of the center of variable circle which touches the smaller circle from outside and the bigger circle from inside is an ellipse.

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**926.** How many real tangents can be drawn from the point (4, 3) to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$? Find the equation of these tangents and the angle between them.

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**927.** For an ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ with vertices A and A', drawn at the point P in the first quadrant meets the y axis in Q and the chord A'P meets the y axis in M. If 'O' is the origin then $OQ^2 - MQ^2$

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**928.** The first artificial satellite to orbit the earth was Sputnik I. Its highest point above earth's surface was 947 km, and its lowest point was 228 km. The center of the earth was at one focus of the elliptical orbit. The radius of the earth is 6378 km. Find the eccentricity of the orbit.

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**929.** Which of the following can be slope of tangent to the hyperbola $4x^2 - y^2 = 4$? (a)1 (b) $-3$ (c) 2 (d) $-\frac{3}{2}$

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**930.** A tangent to the ellipes $\frac{x^2}{25} + \frac{y^2}{16} = 1$ at any points meet the line $x = 0$ at a point Q Let R be the image of Q in the line $y = x$, then circle whose extremities of a dameter are $Q$ and $R$ passes through a fixed point, the fixed point is

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931. Tangents are drawn to the hyperbola $3x^2 - 2y^2 = 25$ from the point $\left(0, \frac{5}{2}\right)$. Find their equations.

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932. Suppose that the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{5} = 1$ are $\left(f_1, 0\right) and \left(f_2, 0\right)$ where $f_1 > 0 and f_2 < 0$. Let $P_1 and P_2$ be two parabolas with a common vertex at (0, 0) and with foci at $\left(f_1.0\right) and$ (2f_2 , 0), respectively. Let$T_1$ be a tangent to $P_1$ which passes through $\left(2f_2, 0\right)$ and $T_2$ be a tangents to $P_2$ which passes through $\left(f_1, 0\right)$. If $m_1$ is the slope of $T_1$ and $m_2$ is the slope of $T_2$, then the value of $\left(\frac{1}{m12} + m22\right)$ is

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**933.** From the center $C$ of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , perpendicular $CN$ is drawn on any tangent to it at the point $P(a\sec\theta, b\tan\theta)$ in the first quadrant. Find the value of $\theta$ so that the area of $CPN$ is maximum.

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**934.** A vertical line passing through the point $(h, 0)$ intersects the ellipse $\frac{x^2}{4} + \frac{y^2}{3} = 1$ at the points $P$ and $Q$.Let the tangents to the ellipse at P and Q meet at $R$. If $\delta(h)$ Area of triangle $\delta PQR$, and $\delta_1$ $\max_{\frac{1}{2} \le h \le 1}\delta(h)$ A further $\delta_2$ $\min_{\frac{1}{2} \le h \le 1}\delta(h)$ Then $\frac{8}{\sqrt{5}}\delta_1 - 8\delta_2$

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**935.** A common tangent to $9x^2 - 16y^2 = 144$ and $x^2 + y^2 = 9$, is

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**936.** Find the equation of tangents to the curve $4x^2 - 9y^2 = 1$ which are parallel to $4y = 5x + 7$.

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**937.** Find the equation of the locus of the middle points of the chords of the hyperbola $2x^2 - 3y^2 = 1$, each of which makes an angle of $45^0$ with the x-axis.

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**938.** Find the angle between the asymptotes of the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$.

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**939.** If a hyperbola passing through the origin has $3x - 4y - 1 = 0$ and $4x - 3y - 6 = 0$ as its asymptotes, then find the equation of its transvers and conjugate axes.

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**940.** Let E1 and E2, be two ellipses whose centers are at the origin.The major axes of E1 and E2, lie along the x-axis and the y-axis, respectively. Let S be the circle $x^2 + (y - 1)^2 = 2$. The straight line x+ y =3 touches the curves S, E1 and E2 at P,Q and R, respectively. Suppose that $PQ = PR = \frac{2\sqrt{2}}{3}$.If e1 and e2 are the eccentricities of E1 and E2, respectively, then the correct expression(s) is(are):

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**941.** A triangle has its vertices on a rectangular hyperbola. Prove that the orthocentre of the triangle also lies on the same hyperbola.

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**942.** From any point on any directrix of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1, a>b,$ a pari of tangents is drawn to the auxiliary circle. Show that the chord of contact will pass through the correspoinding focus of the ellipse.

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**943.** Find the equation of the asymptotes of the hyperbola $3x^2+10xy+8y^2+14x+22y+7=0$

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**944.** A tangent is drawn to the ellipse to cut the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and to cut the ellipse $\frac{x^2}{c^2}+\frac{y^2}{d^2}=1$ at the points P and Q. If the tangents are at right angles, then the value of $\left(\frac{a^2}{c^2}\right)+\left(\frac{b^2}{d^2}\right)$ is

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**945.** $PQ$ and $RS$ are two perpendicular chords of the rectangular hyperbola $xy = c^2$. If $C$ is the center of the rectangular hyperbola, then find the value of product of the slopes of $CP, CQ, CR,$ and $CS$.

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**946.** $O$is the origin & also the centre of two concentric circles having radii of the inner & the outer circle as $a\&b$ respectively. A line $OPQ$ is drawn to cut the inner circle in $P$ & the outer circle in $Q$. $PR$ is drawn parallel to the $y$-axis & $QR$ is drawn parallel to the $x$-axis. Prove that the locus of $R$ is an ellipse touching the two circles. If the focii of this ellipse lie on the inner circle, find the ratio of inner: outer radii & find also the eccentricity of the ellipse.

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**947.** If the tangents to the parabola $y^2 = 4ax$ intersect the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $AandB$, then find the locus of the point of intersection of the tangents at $AandB$.

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**948.** The tangent at a point $P$ on an ellipse intersects the major axis at $T, andN$ is the foot of the perpendicular from $P$ to the same axis. Show that the circle drawn on $NT$ as diameter intersects the auxiliary circle orthogonally.

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**949.** If $(a\sec\theta, b\tan\theta)$ and $(a\sec\phi, b\tan\phi)$ be two coordinate of the ends of a focal chord passing through $(ae, 0)$ of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ then $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{\phi}{2}\right)$ equals to

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**950.** From any point on the line $y = x + 4,$ tangents are drawn to the auxiliary circle of the ellipse $x^2 + 4y^2 = 4$ . If $P$ and $Q$ are the points of contact and $AandB$ are the corresponding points of $PandQ$ on he ellipse, respectively, then find the locus of the midpoint of $\dot{AB}$

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**951.** Find the area of the triangle formed by any tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ with its asymptotes.

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**952.** If a triangle is inscribed in a n ellipse and two of its sides are parallel to the given straight lines, then prove that the third side touches the fixed ellipse.

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**953.** Normal are drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at point $\theta_1 and th\eta_2$ meeting the conjugate axis at $G_1 and G_2$, respectively. If $\theta_1 + \theta_2 = \frac{\pi}{2}$, prove that $CG_1 \dot{C} G_2 = \frac{a^2 e^4}{e^2 - 1}$, where $C$ is the center of the hyperbola and $e$ is the eccentricity.

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**954.** The tangent at a point $P(a\cos\varphi, b\sin\varphi)$ of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ meets its auxiliary circle at two points, the chord joining which subtends a right angle at the center. Find the eccentricity of the ellipse.

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**955.** Find the product of the length of perpendiculars drawn from any point on the hyperbola $x^2 - 2y^2 - 2 = 0$ to its asymptotes.

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**956.** Tangents are drawn to the ellipse from the point $\left(\frac{a^2}{\sqrt{a^2 - b^2}}, \sqrt{a^2 + b^2}\right))$ . Prove that the tangents intercept on the ordinate through the nearer focus a distance equal to the major axis.

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**957.** Find the locus of point $P$ such that the tangents drawn from it to the given ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ meet the coordinate axes at concyclic points.

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**958.** Find the point $(\alpha, \beta)$ on the ellipse $4x^2 + 3y^2 = 12$, in the first quadrant, so that the area enclosed by the lines $y = x, y = \beta, x = \alpha$ , and the x-axis is maximum.

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**959.** 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

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**960.** On the ellipse $4x^2 + 9y^2 = 1,$ the points at which the tangents are parallel to the line $8x = 9y$ are (a) $\left(\frac{2}{5}, \frac{1}{5}\right)$ (b) $\left(-\frac{2}{5}, \frac{1}{5}\right)$ (c) $\left(-\frac{2}{5}, -\frac{1}{5}\right)$ (d) $\left(\frac{2}{5}, -\frac{1}{5}\right)$

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**961.** Find the eccentricity of the conic $4(2y - x - 3)^2 - 9(2x + y - 1)^2 = 80$

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**962.** The normal at a point $P$ on the ellipse $x^2 + 4y^2 = 16$ meets the x-axis at $Q$ If $M$ is the midpoint of the line segment $PQ$, then the locus of $M$ intersects the latus rectums of the given ellipse at points. (a) $\left(\pm \frac{(3\sqrt{5})}{2} \pm \frac{2}{7}\right)$ (b) $\left(\pm \frac{(3\sqrt{5})}{2} \pm \frac{\sqrt{19}}{7}\right)$ (c)$\left(\pm 2\sqrt{3}, \pm \frac{1}{7}\right)$ (d) $\left(\pm 2\sqrt{3} \pm \frac{4\sqrt{3}}{7}\right)$

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**963.** For all real values of $m$, the straight line $y = mx + \sqrt{9m^2 - 4}$ is a tangent to which of the following certain hyperbolas? (a)$9x^2 + 4y^2 = 36$ (b) $4x^2 + 9y^2 = 36$ (c)$9x^2 - 4y^2 = 36$ (d) $4x^2 - 9y^2 = 36$

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**964.** Let $E$ be the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and $C$ be the circle $x^2 + y^2 = 9$ . Let $PandQ$ be the points (1, 2) and (2, 1), respectively. Then (a)$Q$ lies inside $C$

but outside $E$ (b)$Q$ lies outside both $CandE$ (c)$P$ lies inside both $C$ and $E$

(d)$P$ lies inside $C$ but outside $E$

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**965.** Two rods are rotating about two fixed points in opposite directions. If they start from their position of coincidence and one rotates at the rate double that of the other, then find the locus of point of the intersection of the two rods.

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**966.** Statement 1 : There can be maximum two points on the line $px + qy + r = 0$ , from which perpendicular tangents can be drawn to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ Statement 2 : Circle $x^2 + y^2 = a^2 + b^2$ and the given line can intersect at maximum two distinct points.

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**967.** Find the vertices of the hyperbola $9x^2 - 16y^2 - 36x + 96y - 252 = 0$

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**968.** Statement 1 : Circles $x^2 + y^2 = 9$ and $\left(x - \sqrt{5}\right)\left(\sqrt{2}x - 3\right) + y\left(\sqrt{2}y - 2\right) = 0$ touch each other internally.

Statement 2 : The circle described on the focal distance as diameter of the ellipse $4x^2 + 9y^2 = 36$ touches the auxiliary circle $x^2 + y^2 = 9$ internally.

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**969.** If AOB and COD are two straight lines which bisect one another at right angles, show that the locus of a point P which moves so that $PA \times PB = PC \times PD$ is a hyperbola.

Find its eccentricity.

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**970.** The area of the quadrilateral formed by the tangents at the endpoint of the latus rectum to the ellipse $\frac{x^2}{9} + \frac{y^2}{5} = 1$ is (A) $\frac{27}{4}$ sq. unit (B) 9 sq. units (C) $\frac{27}{2}$ sq. unit (D) 27 sq. unit

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**971.** Find the equation of hyperbola : Whose foci are (4, 2) and (8, 2) and accentricity is 2.

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**972.** If tangents are drawn to the ellipse $x^2 + 2y^2 = 2$, then the locus of the midpoint of the intercept made by the tangents between the coordinate axes is (a) $\frac{1}{2x^2} + \frac{1}{4y^2} = 1$ (b) $\frac{1}{4x^2} + \frac{1}{2y^2} = 1$ (c) $\frac{x^2}{2} + y^2 = 1$ (d) $\frac{x^2}{4} + \frac{y^2}{2} = 1$

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**973.** Two straight lines pass through the fixed points $(\pm a, 0)$ and have slopes whose products is $p > 0$ Show that the locus of the points of intersection of the lines is a hyperbola.

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**974.** Each question has four choices: a, b, c and d, out of which only one is correct. Each question contains Statement 1 and Statement 2. Find the correct answer. Statement 1 : The locus of a moving point $(x, y)$ satisfying $\sqrt{(x+2)^2+y^2}+\sqrt{(x-2)^2+y^2}=4$ is an ellipse. Statement 2 : The distance between $(-2, 0)$ and (2, 0) is 4.

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**975.** Find the lengths of the transvers and the conjugate axis, eccentricity, the coordinates of foci, vertices, the lengths of latus racta, and the equations of the directrices of the following hyperbola: $16x^2-9y^2=-144$.

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**976.** $OA$ and $OB$ are fixed straight lines, $P$ is any point and $PM$ and $PN$ are the perpendiculars from $P$ on $OAandOB,$ respectively. Find the locus of $P$ if the quadrilateral $OMPN$ is of constant area.

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**977.** Find the equation of hyperbola : whose axes are coordinate axes and the distances of one of its vertices from the foci are 3 and 1

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**978.** Statement 1 : The equations of the tangents drawn at the ends of the major axis of the ellipse $9x^2 + 5y^2 - 30y = 0$ is $y = 0, y = 6$ . Statement 2 : The tangents drawn at the ends of the major axis of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are always parallel to the y-axis.

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**979.** Find the equation of hyperbola : Whose center is (1,0), focus is (6,0) and the transverse axis is 6

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**980.** Let $E_1 and E_2$, respectively, be two ellipses $\frac{x^2}{a^2}+y^2=1, and x^2+\frac{y^2}{a^2}=1$ (where $a$ is a parameter). Then the locus of the points of intersection of the ellipses $E_1 and E_2$ is a set of curves comprising two straight lines (b) one straight line one circle (d) one parabola

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**981.** Find the equation of hyperbola : Whose center is (3, 2), one focus is (5, 2) and one vertex is (4, 2)

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**982.** Consider the ellipse $\frac{x^2}{f\left(k^2 + 2k + 5\right)} + \frac{y^2}{f(k + 11)} = 1.$ If $f(x)$ is a positive decreasing function, then (a)the set of values of $k$ for which the major axis is the x-axis is $(-3, 2)$ (b)the set of values of $k$ for which the major axis is the y-axis is $(-\infty, 2)$ (c)the set of values of $k$ for which the major axis is the y-axis is $(-\infty, -3) \cup (2, \infty)$ (d)the set of values of $k$ for which the major axis is the y-axis is $(-3, -\infty, )$

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**983.** An ellipse and a hyperbola have their principal axes along the coordinate axes and have common foci separated by a distance $2\sqrt{3}$. The difference of their focal semi-aixes is equal to 4. It the ratio of their accentricities is $3/7$, find the equaiton of these curves.

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**984.** Two concentric ellipses are such that the foci of one are on the other and their major axes are equal. Let $eande'$ be their eccentricities. Then. the quadrilateral formed by joining the foci of the two ellipses is a parallelogram the angle $\theta$ between their axes is given by $\theta = \cos^{-1}\sqrt{\frac{1}{e^2} + \frac{1}{e'^2} = \frac{1}{e^2 e'^2}}$ If $e^2 + e'^2 = 1$, then the angle between the axes of the two ellipses is $90^0$ none of these

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**985.** If hyperbola $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$ passes through the foci of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then find the eccentricities of ellipse and hyperbola.

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**986.** If the tangent drawn at point $\left(t^2, 2t\right)$ on the parabola $y^2 = 4x$ is the same as the normal drawn at point $\left(\sqrt{5}\cos\theta, 2\sin\theta\right)$ on the ellipse

$4x^2 + 5y^2 = 20,$ then $\theta = \cos^{-1}\left(-\frac{1}{\sqrt{5}}\right)$ (b) $\theta = \cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$ $t = -\frac{2}{\sqrt{5}}$ (d) $t = -\frac{1}{\sqrt{5}}$

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**987.** If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide then $b^2$ is

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**988.** Statement 1 : Any chord of the conic $x^2 + y^2 + xy = 1$ through (0, 0) is bisected at (0, 0). Statement 2 : The center of a conic is a point through which every chord is bisected.

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**989.** Find the coordinates of vertices, foci, eccentricity, latus-rectum and the equations of directrices for the hyperbola $9x^2 - 16y^2 - 72x + 96y - 144 = 0$.

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**990.** Statement 1 : If there is exactly one point on the line $3x + 4y + 5\sqrt{5} = 0$ from which perpendicular tangents can be drawn to the ellipse $\frac{x^2}{a^2} + y^2 = 1, (a > 1)$, then the eccentricity of the ellipse is $\frac{1}{3}$.

Statement 2 : For the condition given in statement 1, the given line must touch the circle $x^2 + y^2 = a^2 + 1$.

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**991.** If the latus rectum of a hyperbola forms an equilateral triangle with the vertex at the centre of the hyperbola, then find the eccentricity of the hyperbola.

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992. Statement 1 : For the ellipse $\frac{x^2}{5} + \frac{y^2}{3} = 1$ , the product of the perpendiculars drawn from the foci on any tangent is 3. Statement 2 : For the ellipse $\frac{x^2}{5} + \frac{y^2}{3} = 1$ , the foot of the perpendiculars drawn from the foci on any tangent lies on the circle $x^2 + y^2 = 5$ which is an auxiliary circle of the ellipse.

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993. If the rectum subtends a right angle at the centre of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then find its eccentricity.

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994. Statement 1 : The locus of the center of a variable circle touching two circle $(x - 1)^2 + (y - 2)^2 = 25$ and $(x - 2)^2 + (y - 1)^2 = 16$ is an ellipse. Statement 2 : If a circle $S_2 = 0$ lies completely inside the circle $S_1 = 0$ ,

then the locus of the center of a variable circle $S = 0$ that touches both the circles is an ellipse.

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**995.** If PQ is a double ordinate of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ such that OPQ is an equilateral triangle, O being the centre of the hyperbola, then find range of the eccentricity (e) of the hyperbola.

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**996.** Find the eccentricity of the hyperbola given by equations $x = \frac{e^t + e^{-1}}{2} and y = \frac{e^t - e^{-1}}{3}, t \in R$.

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**997.** A ray emanating from the point (5,0) is incident on the hyperbola $9x^2 - 16y^2 = 144$ at the point $p\left(8, 3\sqrt{3}\right)$. Find the equation of the reflected ray after first reflection.

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**998.** Statement 1 : If the line $x + y = 3$ is a tangent to an ellipse with focie (4, 3) and $(6, y)$ at the point (1, 2) then $y = 17$. Statement 2 : Tangent and normal to the ellipse at any point bisect the angle subtended by the foci at that point.

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**999.** Normal is drawn at one of the extremities of the latus rectum of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ which meets the axes at points $AandB$ . Then find the area of triangle $OAB(O$ being the origin).

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**1000.** Statement 1 : The area of the ellipse $2x^2 + 3y^2 = 6$ is more than the area of the circle $x^2 + y^2 - 2x + 4y + 4 = 0$. Statement 2 : The length f the semi-major axis of an ellipse is more that the radius of the circle.

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**1001.** An ellipse and a hyperbola are confocal (have the same focus) and the conjugate axis of the hyperbola is equal to the minor axis of the ellipse. If $e_1$ and $e_2$ are the eccentricities of the ellipse and the hyperbola, respectively, then prove that $\frac{1}{e_1^2} + \frac{1}{e_2^2} = 2$.

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**1002.** The distance between two directrices of a rectangular hyperbola is 10 units. Find the distance between its foci.

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**1003.** Statement 1 : Tangents are drawn to the ellipse $\frac{x^2}{4} + \frac{y^2}{2} = 1$ at the points where it is intersected by the line $2x + 3y = 1$ . The point of intersection of these tangents is (8, 6). Statement 2 : The equation of the chord of contact to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ from an external point is given by $\frac{xx_1}{a^2} + \frac{yy_1}{b^2} - 1 = 0$

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**1004.** Find the equation of normal to the hyperbola $3x^2 - y^2 = 1$ having slope $\frac{1}{3}$.

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**1005.** a triangle $ABC$ with fixed base $BC$ , the vertex $A$ moves such that $\cos B + \cos C = 4\sin^2\left(\frac{A}{2}\right)$. If $a, bandc,$ denote the length of the sides of the triangle opposite to the angles $A, B, andC$ , respectively, then (a)

$b + c = 4a$ (b) $b + c = 2a$ (c) the locus of point $A$ is an ellipse (d) the locus of point $A$ is a pair of straight lines

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**1006.** Find the equation of normal to the hyperbola $x^2 - 9y^2 = 7$ at point (4, 1).

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**1007.** A circle has the same center as an ellipse and passes through the foci $F_1 and F_2$ of the ellipse, such that the two cuves intersect at four points. Let $P$ be any one of their point of intersection. If the major axis of the ellipse is 17 and the area of triangle $PF_1F_2$ is 30, then the distance between the foci is (a)$13$ (b)$10$ (c)$11$ (d) none of these

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**1008.** $C$ is the center of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ The tangent at any point $P$ on this hyperbola meet the straight lines $bx - ay = 0$ and $bx + ay = 0$ at points $QandR$ , respectively. Then prove that $\dot{C}QC\dot{R} = a^2 + b^2$

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**1009.** The eccentricity of the conjugate hyperbola of the hyperbola $x^2 - 3y^2 = 1$ is 2 (b) $2\sqrt{3}$ (c) 4 (d) $\frac{4}{5}$

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**1010.** The angle subtended by common tangents of two ellipses $4(x - 4)^2 + 25y^2 = 100and4(x + 1)^2 + y^2 = 4$ at the origin is (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$

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**1011.** $PN$ is the ordinate of any point $P$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and ∀' is its transvers axis. If $Q$ divides $AP$ in the ratio $a^2 : b^2$, then prove that $NQ$ is perpendicular to $A'P$

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**1012.** If $PQR$ is an equilateral triangle inscribed in the auxiliary circle of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a > b)$, and $P'Q'R'$ is the correspoinding triangle inscribed within the ellipse, then the centroid of triangle $P'Q'R'$ lies at center of ellipse focus of ellipse between focus and center on major axis none of these

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**1013.** For the hyperbola $9x^2 - 16y^2 - 18x + 32y - 151 = 0$,

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**1014.** Find the equation of hyperbola : Whose center is $(-3, 2)$, one vertex is $(-3, 4)$, and eccentricity is $\frac{5}{2}\cdot$

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**1015.** The locus of the point of intersection of the lines $\sqrt{3}x - y - 4\sqrt{3}t = 0$ and sqrt3tx+ty-4sqrt3=0` (where t is a parameter) is a hyperbola whose eccentricity is

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**1016.** Find the eccentricity of the hyperbola with asymptotes $3x + 4y = 2$ and $4x - 3y = 2$.

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**1017.** An ellipse having foci at (3, 3) and ( - 4, 4) and passing through the origin has eccentricity equal to $\frac{3}{7}$ (b) $\frac{2}{7}$ (c) $\frac{5}{7}$ (d) $\frac{3}{5}$

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**1018.** If $S$ and $S'$ are the foci, C is the centre, and P is a point on a rectangular hyperbola, show that $SP \times S'P = \left(CP_2\right)$.

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**1019.** $P$ and $Q$ 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 $PBQ$ is an equilateral triangle, then the eccentricity of the ellipse is

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**1020.** If $PN$ is the perpendicular from a point on a rectangular hyperbola $xy = c^2$ to its asymptotes, then find the locus of the midpoint of $PN$

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**1021.** A line of fixed length $a + b$ moves so that its ends are always on two fixed perpendicular straight lines. Then the locus of the point which divides this line into portions of length $aandb$ is a/an (a)ellipse (b) parabola (c)straight line (d) none of these

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**1022.** The equation of the transverse and conjugate axes of a hyperbola are, respectively, $x + 2y - 3 = 0$ and $2x - y + 4 = 0$, and their respective lengths are $\sqrt{2}$ and $2/\sqrt{3}$. The eqaution of the hyperbola is

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**1023.** Show that the acute angle between the asymptotes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, \left(a^2 > b^2\right)$, is $2\cos^{-1}\left(\frac{1}{e}\right)$, where $e$ is the eccentricity of the hyperbola.

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**1024.** With a given point and line as focus and directrix, a series of ellipses are described. The locus of the extremities of their minor axis is an (a)ellipse (b)a parabola (c)a hyperbola (d)none of these

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**1025.** If the vertex of a hyperbola bisects the distance between its centre and the corresponding focus, then the ratio of the square of its conjugate axis to the square of its transverse axis is

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**1026.** Find the equation of the hyperbola which has $3x - 4y + 7 = 0$ and $4x + 3y + 1 = 0$ as its asymptotes and which passes through the origin.

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**1027.** If the ellipse $\frac{x^2}{4} + y^2 = 1$ meets the ellipse $x^2 + \frac{y^2}{a^2} = 1$ at four distinct points and $a = b^2 - 5b + 7$, then $b$ does not lie in (a)$[4, 5]$ (b) $( - \infty, 2) \cup (3, \infty)$ (c)$( - \infty, 0)$ (d) $[2, 3]$

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**1028.** The equation $16x^2 - 3y^2 - 32x + 12y - 44 = 0$ represents a hyperbola. the length of whose transvers axis is $4\sqrt{3}$ the length of whose transvers axis is 4 whose center is $( - 1, 2)$ whose eccentricity is $\sqrt{\frac{19}{3}}$

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**1029.** If the base of a triangle and the ratio of tangent of half of base angles are given, then identify the locus of the opposite vertex.

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**1030.** $S_1, S_2$, are foci of an ellipse of major axis of length $10 units$ and $P$ is any point on the ellipse such that perimeter of triangle $PS_1S_2$, is $15$. Then eccentricity of the ellipse is:

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**1031.** Let LL' be the latus rectum through the focus of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and A' be the farther vertex. If $\Delta A' LL'$ is equilateral, then the eccentricity of the hyperbola is

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**1032.** Find the equation of the common tangent in the first quadrant of the circle $x^2 + y^2 = 16$ and the ellipse $\frac{x^2}{25} + \frac{y^2}{4} = 1$.Also find the length of the intercept of the tangent between the coordinates axes.

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**1033.** If the normal at $p(\theta)$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ meets the transverse axis at G, then prove that $AG \cdot A'G = a^2\left(e^4\sec^2\theta - 1\right)$, where A and A' are the vertices of the hyperbola.

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**1034.** The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

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**1035.** Prove that in an ellipse, the perpendicular from a focus upon any tangent and the line joining the centre of the ellipse to the point of contact meet on the corresponding directrix.

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**1036.** Find the asymptotes of the curve $xy - 3y - 2x = 0$ .

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**1037.** With one focus of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ as the centre, a circle is drawn which is tangent to the hyperbola with no part of the circle being outside the hyperbola. The radius of the circle is

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**1038.** The radius of the circle passing throgh the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and haivng centre (0,3) is

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**1039.** Two circles are given such that they neither intersect nor touch. Then identify the locus of the center of variable circle which touches both the circles externally.

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**1040.** If the eccentricity of the hyperbola $x^2 - y^2 \sec^2\alpha = 5$ is $\sqrt{3}$ times the eccentricity of the ellipse $x^2 \sec^2\alpha + y^2 = 25$, then a value of $\alpha$ is

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**1041.** 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 :

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**1042.** Statement 1 : If (3, 4) is a point on a hyperbola having foci (3, 0) and $(\lambda, 0)$ , the length of the transverse axis being 1 unit, then $\lambda$ can take the value 0 or 3. Statement 2 : $\left|S'P - SP\right| = 2a,$ where $SandS'$ are the two foci, $2a$ is the length of the transverse axis, and $P$ is any point on the hyperbola.

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**1043.** Find the co-ordinates of all the points P on the ellipse, $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ ,for which the area of the triangle PON is maximum, where O denotes the origin and N, the foot of the perpendicular from O to tangent at P.

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**1044.** If $\alpha + \beta = 3\pi$ , then the chord joining the points $\alpha$ and $\beta$ for the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ passes through which of the following points? (a)Focus (b) Center (c)One of the endpoints of the transverse exis. (d)One of the endpoints of the conjugate exis.

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**1045.** If from any point $P\left(x_1, y_1\right)$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then prove that corresponding chord of contact touches the another branch of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$.

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**1046.** Consider the family ol circles $x^2 + y^2 = r^2, 2 < r < 5$ . If in the first quadrant, the common tangnet to a circle of this family and the ellipse

$4x^2 + 25y^2 = 100$ meets the co-ordinate axes at A and B, then find the equation of the locus of the mid-point of AB.

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**1047.** Prove that the locus of the point of intersection of the tangents at the ends of the normal chords of the hyperbola $x^2 - y^2 = a^2$ is $a^2(y^2 - x^2) = 4x^2y^2$.

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**1048.** Statement 1:If a point $(x_1, y_1)$ lies in the shaded region $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, shown in the figure, then $\frac{x^2}{a^2} - \frac{y^2}{b^2} < 0$ Statement 2 : If $P(x_1, y_1)$ lies outside the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, then $\frac{x_1^2}{a^2} - \frac{y_1^2}{b^2} < 1$

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**1049.** Let P be a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, 0 < b < a$ and let the line parallel to y-axis passing through P meet the circle $x^2 + y^2 = a^2$ at the point Q such that P and Q are on the same side of x-axis. For two positive real numbers r and s, find the locus of the point R on PQ such that $PR : RQ = r : s$ and P varies over the ellipse.

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**1050.** Find the coordinates of the foci and the centre of the hyperbola

$$\left(\frac{(3x - 4y - 12)^2}{100}\right) - \left(\frac{(4x + 3y - 12)^2}{225}\right) = 1$$

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**1051.** Number of points from where perpendicular tangents can be drawn to the curve $\frac{x^2}{16} - \frac{y^2}{25} = 1$ is

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**1052.** On which curve does the perpendicular tangents drawn to the hyperbola $\frac{x^2}{25} - \frac{y^2}{16} = 1$ intersect?

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**1053.** The minimum area of the triangle formed by the tangent to $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the coordinate axes is (a)$ab$ sq. units (b) $\frac{a^2 + b^2}{2} \cdot sq\ units$ (c)$\frac{(a+b)^2}{2} \cdot sq\ units$ (d) $\frac{a^2 + ab + b^2}{3}$ sq. units

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**1054.** Statement 1 : The equations of tangents to the hyperbola $2x^2 - 3y^2 = 6$ which is parallel to the line $y = 3x + 4$ are $y = 3x - 5$ and $y = 3x + 5$. Statement 2 : For a given slope, two parallel tangents can be drawn to the hyperbola.

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**1055.** $P$ is a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, $N$ is the foot of the perpendicular from $P$ on the transverse axis. The tangent to the hyperbola at $P$ meets the transvers axis at $T$. If $O$ is the center of the hyperbola, then find the value of $OTxON$.

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**1056.** 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

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**1057.** Statement 1 : Every line which cuts the hyperbola $\frac{x^2}{4} - \frac{y^2}{16} = 1$ at two distinct points has slope lying in $(-2, 2)$. Statement 2 : The slope of the tangents of a hyperbola lies in $(-\infty, -2) \cup (2, \infty)$.

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**1058.** Find the equation of the hyperbola whose foci are (8, 3) and (0, 3) and eccentricity is $\frac{4}{3}$.

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**1059.** The number of values of $c$ such that the straight line $y = 4x + c$ touches the curve $\frac{x^2}{4} + \frac{y^2}{1} = 1$ is 0 (b) 1 (c) 2 (d) infinite

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**1060.** Find the equation of tangents to the curve $4x^2 - 9y^2 = 1$ which are parallel to $4y = 5x + 7$.

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**1061.** Statement 1 : The asymptotes of hyperbolas $3x + 4y = 2$ and $4x - 3y = 5$ are the bisectors of the transvers and conjugate axes of the hyperbolas. Statement 2 : The transverse and conjugate axes of the hyperbolas are the bisectors of the asymptotes.

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**1062.** The line passing through the extremity $A$ of the major exis and extremity $B$ of the minor axis of the ellipse $x^2 + 9y^2 = 9$ meets is auxiliary circle at the point $\dot{M}$ Then the area of the triangle with vertices at $A, M,$ and $O$ (the origin) is (a)31/10 (b) 29/10 (c) 21/10 (d) 27/10

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**1063.** Find the value of $m$ for which $y = mx + 6$ is tangent to the hyperbola $\frac{x^2}{100} - \frac{y^2}{49} = 1$

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**1064.** Let a hyperbola passes through the focus of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$. The transverse and conjugate axes of this hyperbola coincide with the major and minor axis of the given ellipse. Also, the product of the eccentricities of the given ellipse and hyperbola is 1. Then,

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**1065.** On the $x - y$ plane, the eccentricity of an ellipse is fixed (in size and position) by 1) both foci 2) both directrices 3)one focus and the corresponding directrix 4)the length of major axis.

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**1066.** Find the equation of tangent to the conic $x^2 - y^2 - 8x + 2y + 11 = 0$ at $(2, 1)$

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**1067.** Statement 1 : A bullet is fired and it hits a target. An observer in the same plane heard two sounds: the crack of the rifle and the thud of the bullet striking the target at the same instant. Then the locus of the observer is a hyperbola where the velocity of sound is smaller than the velocity of the bullet. Statement 2 : If the difference of distances of a point $P$ from two fixed points is constant and less than the distance between the fixed points, then the locus of $P$ is a hyperbola.

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**1068.** The equation of one of the directrices of a hyperboda is $2x + y = 1$, the corresponding focus is (1, 2) and $e = \sqrt{3}$ . Find the equation of the hyperbola and the coordinates of the center and the second focus.

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**1069.** The distance of a point on the ellipse $\frac{x^2}{6} + \frac{y^2}{2} = 1$ from the center is 2. Then the eccentric angle of the point is $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{6}$

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**1070.** A hyperbola having the transverse axis of length $2\sin\theta$ is confocal with the ellipse $3x^2 + 4y^2 = 12$ . Then its equation is (a) $x^2 cosec^2\theta - y^2\sec^2\theta = 1$ (b) $x^2\sec^2\theta - y^2 cosec^2\theta = 1$ (c) $x^2\sin^2\theta - y^2\cos^2\theta = 1$ (d)$x^2\cos^2\theta - y^2\sin^2\theta = 1$

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**1071.** If it is possible to draw the tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ having slope 2, then find its range of eccentricity.

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**1072.** The set of values of $m$ for which it is possible to draw the chord $y = \sqrt{m}x + 1$ to the curve $x^2 + 2xy + \left(2 + \sin^2\alpha\right)^y \wedge 2 = 1$, which subtends a right angle at the origin for some value of $\alpha$, is $[2, 3]$ (b) $[0, 1]$ $[1, 3]$ (d) none of these

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**1073.** Consider a branch of the hypebola $x^2 - 2y^2 - 2\sqrt{2}x - 4\sqrt{2}y - 6 = 0$ with vertex at the point A. Let B be one of the end points of its latus rectum. If C is the focus of the hyperbola nearest to the point A, then the area of the triangle ABC is (A) $1 - \sqrt{\frac{2}{3}}$ (B) $\sqrt{\frac{3}{2}} - 1$ (C) $1 + \sqrt{\frac{2}{3}}$ (D) $\sqrt{\frac{3}{2}} + 1$

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**1074.** If the tangents to the hyperbola $x^2 - 9y^2 = 9$ are drawn from point (3, 2), then

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**1075.** Let $a and b$ be nonzero real numbers. Then the equation $(ax^2 + by^2 + c)(x^2 - 5xy + 6y^2) = 0$ represents. (a)four straight lines, when $c = 0$ and $a, b$ are of the same sign. (b)two straight lines and a circle, when $a = b$ and $c$ is of sign opposite to that $a$ (c)two straight lines and a hyperbola, when $a and b$ are of the same sign and $c$ is of sign opposite to that of $a$ (d)a circle and an ellipse, when $a and b$ are of the same sign and $c$ is of sign opposite to that of $a$

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**1076.** $\frac{x^2}{r^2 - r - 6} + \frac{y^2}{r^2 - 6r + 5} = 1$ will represent the ellipse if $r$ lies in the interval

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**1077.** Find the equations to the common tangents to the two hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$

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**1078.** A parabola is drawn with focus at one of the foci of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . If the latus rectum of the ellipse and that of the parabola are same, then the eccentricity of the ellipse is (a)$1 - \frac{1}{\sqrt{2}}$ (b) $2\sqrt{2} - 2$ (c) $\sqrt{2} - 1$ (d) none of these

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**1079.** Let $P(6, 3)$ be a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1.$ If the normal at point P intersects the x-axis at (9, 0), then find the eccentricity of the hyperbola.

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**1080.** Find the equation of the common tangent to the curves $y^2 = 8x$ and xy=-1.

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**1081.** If the maximum distance of any point on the ellipse $x^2 + 2y^2 + 2xy = 1$ from its center is $r$, then $r$ is equal to

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**1082.** Let a hyperbola passes through the focus of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$. The transverse and conjugate axes of this hyperbola coincide with the major and minor axis of the given ellipse. Also, the product of the eccentricities of the given ellipse and hyperbola is 1. Then,

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**1083.** Let $P_i$ and $P_i'$ be the feet of the perpendiculars drawn from the foci $S and S'$ on a tangent $T_i$ to an ellipse whose length of semi-major axis is 20. If $\sum_{i=0}^{10}(SP_i)(S'P_i') = 2560$, then the value of eccentricity is (a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

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**1084.** An ellipse intersects the hyperbola $2x^2 - 2y^2 = 1$ orthogonally. The eccentricity of the ellipse is reciprocal to that of the hyperbola. If the axes of the ellipse are along the coordinate axes, then (a) equation of ellipse is $x^2 + 2y^2 = 2$(b) the foci of ellipse are $(\pm 1, 0)$ (c) equation of ellipse is $(x^2 + 2y = 4)$ (d) the foci of ellipse are $(\pm 2, 0)$

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**1085.** The number of points on the ellipse $\frac{x^2}{50} + \frac{y^2}{20} = 1$ from which a pair of perpendicular tangents is drawn to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ is (a)0 (b) 2

(c) 1 (d) 4

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**1086.** Let the eccentricity of the hyperbola $\frac{x^2}{b^2} - \frac{y^2}{b^2} = 1$ be reciprocal to that of the ellipse $x^2 + 4y^2 = 4$. If the hyperbola passes through a focus of the ellipse, then

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**1087.** The equation of the ellipse whose axes are coincident with the coordinates axes and which touches the straight lines $3x - 2y - 20 = 0$ and $x + 6y - 20 = 0$ is (a) $\frac{x^2}{40} + \frac{y^2}{10} = 1$ (b) $\frac{x^2}{5} + \frac{y^2}{8} = 1$ (c) $\frac{x^2}{10} + \frac{y^2}{40} = 1$ (d) $\frac{x^2}{40} + \frac{y^2}{30} = 1$

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**1088.** Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the sraight line $2x - y = 1$. The points of contact of the tangents on the hyperbola are (A) $\left(\frac{2}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (B) $\left(-\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (C) $\left(3\sqrt{3}, -2\sqrt{2}\right)$ (D) $\left(-3\sqrt{3}, 2\sqrt{2}\right)$

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**1089.** An ellipse with major and minor axes lengths $2a$ and $2b$, respectively, touches the coordinate axes in the first quadrant. If the foci are $\left(x_1, y_1\right) and \left(x_2, y_2\right)$, then the value of $x_1x_2$ and $y_1y_2$ is a) $a^2$ (b) $b^2$ (c) $a^2b^2$ (d) $a^2 + b^2$

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**1090.** Let d be the perpendicular distance from the centre of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ to the tangent drawn at a point P on the ellipse. If $F_1 \& F_2$

are the two foci of the ellipse, then show the $\left(PF_1 - PF_2\right)^2 = 4a^2\left[1 - \frac{b^2}{d^2}\right]$

.

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**1091.** From a point P(1, 2), pair of tangents are drawn to hyperbola, one tangent ot each arm of hyperbola. Equations of asymptotes of hyperbola are $\sqrt{3}x - y + 5 = 0$ and $\sqrt{3}x + y - 1 = 0$. Find the eccentricity of hyperbola.

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**1092.** PQ is a chord of length 8 cm to a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length of the tangent TP.

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**1093.** The combined equation of the asymptotes of the hyperbola $2x^2 + 5xy + 2y^2 + 4x + 5y = 0$ is a. $2x^2 + 5xy + 2y^2 + 4x + 5y + 2 = 0$ b. $2x^2 + 5xy + 2y^2 + 4x + 5y - 2 = 0$ c.$2x^2 + 5xy + 2y^2 = 0$ d.none of these

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**1094.** Let $P\left(x_1, y_1\right)$ and $Q\left(x_2, y_2\right), y_1 < 0, y_2 < 0$, be the end points of the latus rectum of the ellipse $x^2 + 4y^2 = 4$. The equations of parabolas with latus rectum PQ are

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**1095.** Let any double ordinate $PNP'$ of the hyperbola $\frac{x^2}{25} - \frac{y^2}{16} = 1$ be produced on both sides to meet the asymptotes in $QandQ'$ . Then $PQP^{\cdot\,'}Q$ is equal to 25 (b) 16 (c) 41 (d) none of these

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**1096.** Tangents drawn from the point $P(2, 3)$ to the circle $x^2 + y^2 - 8x + 6y + 1 = 0$ points A and B. The circumcircle of the $\Delta PAB$ cuts the director circle of ellipse $\frac{(x - 5)^2}{9} + \frac{(y - 3)^2}{b^2} = 1$ orthogonally. Find the value of $b^2$.

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**1097.** For hyperbola whose center is at (1, 2) and the asymptotes are parallel to lines $2x + 3y = 0$ and $x + 2y = 1$ , the equation of the hyperbola passing through (2, 4) is (a) $(2x + 3y - 5)(x + 2y - 8) = 40$ (b) $(2x + 3y - 8)(x + 2y - 5) = 40$ (c) $(2x + 3y - 8)(x + 2y - 5) = 30$ (d) none of these

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**1098.** If from a point P(0,$\alpha$) , two normals other than the axes are drawn to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ , such that $|\alpha| < k$, then the value of 4k is______

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**1099.** The chord of contact of a point $P$ w.r.t a hyperbola and its auxiliary circle are at right angle. Then the point $P$ lies on (a)conjugate hyperbola (b)one of the directrix (c)one of the asymptotes (d) none of these

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**1100.** If the mid-point of a chord of the ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$ (0, 3), then length of the chord is (1) $\frac{32}{5}$ (2) 16 (3) $\frac{4}{5}$ (4)12 (5) 32

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**1101.** If the intercepts made by tangent, normal to a rectangular $x^2 - y^2 = a^2$ with x-axis are $a_1, a_2$ and with y-axis are $b_1, b_2$ then $a_1, a_2 + b_1 b_2 =$

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**1102.** Let the distance between a focus and the corresponding directrix of an ellipse be 8 and the eccentricity be $\frac{1}{2}$. If the length of the minor axis is $k$, then $\frac{\sqrt{3}k}{2}$ is ___________

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**1103.** If S = 0 is the equation of the hyperbola $x^2 + 4xy + 3y^2 - 4x + 2y + 1 = 0$, then the value of k for $S + K = 0$ represents its asymptotes is

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**1104.** Consider an ellipse $E, \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, centered at point $O$ andhaving $ABandCD$ as its major and minor axes, respectively. If $S_1$ is one of the focus of the ellipse, the radius of the incircle of triangle $OCS_1$ is 1 unit, and $OS_1 = 6$ units, then the value of $\frac{a - b}{2}$ is________

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**1105.** If two distinct tangents can be drawn from the Point $(\alpha, 2)$ on different branches of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$ then (1) $|\alpha| < \frac{3}{2}$ (2) $|\alpha| > \frac{2}{3}$ (3)$|\alpha| > 3$ (4) $\alpha = 1$

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**1106.** Suppose $x and y$ are real numbers and that $x^2 + 9y^2 - 4x + 6y + 4 = 0$ . Then the maximum value of $\frac{(4x - 9y)}{2}$ is________

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**1107.** A hyperbola passes through (2,3) and has asymptotes $3x - 4y + 5 = 0$ and $12x + 5y - 40 = 0$ . Then, the equation of its transverse axis is $77x - 21y - 265 = 0$ $21x - 77y + 265 = 0$ $21x - 77y - 265 = 0$ $21x + 77y - 265 = 0$

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**1108.** Rectangle ABCD has area 200.An ellipse with area $200\pi$ passes through A and C and has foci at B and D.Find the perimeter of the rectangle.

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**1109.** The locus of the image of the focus of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1, (a > b)$, with respect to any of the tangents to the ellipse is:

(a) $(x + 4)^2 + y^2 = 100$ (b) $(x + 2)^2 + y^2 = 50$ (c) $(x - 4)^2 + y^2 = 100$ (d) $(x + 2)^2 + y^2 = 50$

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**1110.** If x = 9 is the chord of contact of the hyperbola $x^2 - y^2 = 9$, then the equation of the corresponding pair of tangents is

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**1111.** A point on the ellipse $x^2 + 3y^2 = 37$ where the normal is parallel to the line $6x - 5y = 2$ is $(5, -2)$ (b) $(5, 2)$ (c) $(-5, 2)$ (d) $(-5, -2)$

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**1112.** Let $P(a\sec\theta, b\tan\theta)$ and $Q(a\sec c\phi, b\tan\phi)$ (where $\theta + \phi = \frac{\pi}{2}$ be two points on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ If $(h, k)$ is the point of intersection of the normals at $P$ and $Q$ then $k$ is equal to (A) $\frac{a^2 + b^2}{a}$ (B) $-\left(\frac{a^2 + b^2}{a}\right)$ (C) $\frac{a^2 + b^2}{b}$ (D) $-\left(\frac{a^2 + b^2}{b}\right)$

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**1113.** If a pair of variable straight lines $x^2 + 4y^2 + \alpha xy = 0$ (where $\alpha$ is a real parameter) cut the ellipse $x^2 + 4y^2 = 4$ at two points A and B, then the locus of the point of intersection of tangents at A and B is

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**1114.** The line $2x + y = 1$ is tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If this line passes through the point of intersection of the nearest directrix and the x-axis, then the eccentricity of the hyperbola is

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**1115.** The equation $3x^2 + 4y^2 - 18x + 16y + 43 = k$ (a)represents an empty set, if $k < 0$ (b)represents an ellipse, if $k > 0$ (c)represents a point, if $k = 0$ (d)cannot represent a real pair of straight lines for any value of $k$

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**1116.** Which of the following is/are true about the ellipse $x^2 + 4y^2 - 2x - 16y + 13 = 0$? the latus rectum of the ellipse is 1. The distance between the foci of the ellipse is $4\sqrt{3}$. The sum of the focal distances of a point $P(x, y)$ on the ellipse is 4. Line $y = 3$ meets the tangents drawn at the vertices of the ellipse at points $P$ and $Q$ . Then $PQ$ subtends a right angle at any of its foci.

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**1117.** If a ray of light incident along the line $3x + \left(5 - 4\sqrt{2}\right)y = 15$ gets reflected from the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ , then its reflected ray goes along the line. $x\sqrt{2} - y + 5 = 0$ (b) $\sqrt{2}y - x + 5 = 0$ $\sqrt{2}y - x - 5 = 0$ (d) none of these

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**1118.** Which of the following is/are true? There are infinite positive integral values of $a$ for which $(13x - 1)^2 + (13y - 2)^2 = \frac{(5x + 12y - 1)^2}{a}$ represents an ellipse. The minimum distance of a point (1, 2) from the ellipse $4x^2 + 9y^2 + 8x - 36y + 4 = 0$ is 1 If from a point $P(0, \alpha)$ two normals other than the axes are drawn to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ then $|\alpha| < \frac{9}{4}\cdot$ If the length of the latus rectum of an ellipse is one-third of its major axis, then its eccentricity is equal to $1\sqrt{3}$

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**1119.** If the sum of the slopes of the normal from a point $P$ to the hyperbola $xy = c^2$ is equal to $\lambda\left(\lambda \in R^+\right)$, then the locus of point $P$ is (a) $x^2 = \lambda c^2$ (b) $y^2 = \lambda c^2$ (c)$xy = \lambda c^2$ (d) none of these

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**1120.** If the tangent at the point $P(\theta)$ to the ellipse $16x^2 + 11y^2 = 256$ is also a tangent to the circle $x^2 + y^2 - 2x = 15$, then $\theta =$ (a)$\frac{2\pi}{3}$ (b) $\frac{4\pi}{3}$ (c) $\frac{5\pi}{3}$ (d) $\frac{\pi}{3}$

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**1121.** If the normal to the given hyperbola at the point $\left(ct, \frac{c}{t}\right)$ meets the curve again at $\left(ct', \frac{c}{t'}\right)$, then (A) $t^3t' = 1$ (B) $t^3t' = -1$ (C) $tt' = 1$ (D) $tt' = -1$

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**1122.** If the equation of the ellipse is $3x^2 + 2y^2 + 6x - 8y + 5 = 0$ , then which of the following is/are true? (a) $e = \frac{1}{\sqrt{3}}$ (b)Center is $(-1, 2)^{\cdot}$ (c)Foci are $(-1, 1) and (-1, 3)^{\cdot}$ (d)Directrices are $y = 2 \pm \sqrt{3}$

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**1123.** A normal to the hyperbola $\frac{x^2}{4} - \frac{y^2}{1} = 1$ has equal intercepts on the positive x- and y-axis. If this normal touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then $a^2 + b^2$ is equal to (a)5 (b) 25 (c) 16 (d) none of these

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1124. If the chord through the points whose eccentric angles are $\theta$ and $\varphi$ on the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ passes through a focus, then the value of $\tan\left(\frac{\theta}{2}\right)\tan\left(\frac{\varphi}{2}\right)$ is $\frac{1}{9}$ (b) $-9$ (c) $-\frac{1}{9}$ (d) 9

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1125. The number of points on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 3$ from which mutually perpendicular tangents can be drawn to the circle $x^2 + y^2 = a^2$ is/are (a)0 (b) 2 (c) 3 (d) 4

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1126. The coordinates (2, 3) and (1, 5) are the foci of an ellipse which passes through the origin. Then the equation of the (a)tangent at the origin is $\left(3\sqrt{2} - 5\right)x + \left(1 - 2\sqrt{2}\right)y = 0$ (b)tangent at the origin is

$\left(3\sqrt{2}+5\right)x+\left(1+2\sqrt{2}y\right)=0$ (c)tangent at the origin is $\left(3\sqrt{2}+5\right)x-\left(2\sqrt{2+1}\right)y=0$ (d)tangent at the origin is $\left(3\sqrt{2}-5\right)-y\left(1-2\sqrt{2}\right)=0$

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**1127.** If tangent PQ and PR and drawn from a variable point P to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1(a>b)$, so that the fourth vertex S of parallelogram PQRS lies on the circumcircle of triangle PQR, then locus of P is

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**1128.** If the variable line $y=kx+2h$ is tangent to an ellipse $2x^2+3y^2=6$, then the locus of $P(h,k)$ is a conic $C$ whose eccentricity is $e$. Then the value of $3e^2$ is_________

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**1129.** The locus of a point, from where the tangents to the rectangular hyperbola $x^2 - y^2 = a^2$ contains an angle of $45°$, is

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**1130.** The value of $a$ for the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a > b),$ if the extremities of the latus rectum of the ellipse having positive ordinates lie on the parabola $x^2 = 2(y - 2)$ is ___

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**1131.** The tangent at a point $P$ on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ meets one of the directrix at $\dot{F}$ If $PF$ subtends an angle $\theta$ at the corresponding focus, then $\theta = \frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{3\pi}{4}$ (d) $\pi$

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**1132.** If $x, y \in R$, satisfies the equation $\frac{(x-4)^2}{4} + \frac{y^2}{9} = 1$, then the difference between the largest and the smallest valus of the expression $\frac{x^2}{4} + \frac{y^2}{9}$ is_____

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**1133.** N is the foot of the perpendicular from P on the transverse axis. The tangent to the hyperbola at P meets the transverse axis at T. If O is the center of the hyperbola the OT.ON is equal to:

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**1134.** The locus of the foot of the perpendicular from the center of the hyperbola xy = 1 on a variable tangent is

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**1135.** Find the range of parameter $a$ for which a unique circle will pass through the points of intersection of the hyperbola $x^2 - y^2 = a^2$ and the parabola $y = x^2$. Also, find the equation of the circle.

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**1136.** Show that midpoint of focal chords of a hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = i$ lie on another hyperbola having same eccentricity.

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**1137.** If the normal at the point $P(\theta)$ to the ellipse $\frac{x^2}{14} + \frac{y^2}{5} = 1$ intersects it again at the point $Q(2\theta)$, then $\cos\theta$ is equal to (A) $\frac{2}{3}$ (B) $\frac{-2}{3}$ (C) $\frac{3}{4}$ (D) non of these

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**1138.** A tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ cuts the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at $PandQ$ . Show that the locus of the midpoint of $PQ$ is $\left(\frac{x^2}{a^2} + \frac{y^2}{b^2}\right)^2 = \frac{x^2}{a^2} - \frac{y^2}{b^2}$.

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**1139.** Prove that the part of the tangent at any point of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ intercepted between the point of contact and the transvers axis is a harmonic mean between the lengths of the perpendiculars drawn from the foci on the normal at the same point.

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**1140.** A variable line $y = mx - 1$ cuts the lines $x = 2y$ and $y = -2x$ at points $AandB$ . Prove that the locus of the centroid of triangle $OAB(O$ being the origin) is a hyperbola passing through the origin.

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**1141.** Statement 1 : If $a and b$ are real numbers and $c > 0$, then the locus represented by the equation $|ay - bx| = c\sqrt{(x - a)^2 + (y - b)^2}$ is an ellipse. Statement 2 : An ellipse is the locus of a point which moves in a plane such that the ratio of its distances from a fixed point (i.e., focus) to that from the fixed line (i.e., directrix) is constant and less than 1.

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**1142.** Two tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ having $m_1 and m_2$ cut the axes at four concyclic points. Fid the value of $m_1 m_2$.

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**1143.** A tangent having slope of $-\frac{4}{3}$ to the ellipse $\frac{x^2}{18} + \frac{y^2}{32} = 1$ intersects the major and minor axes at points $A and B$, respectively. If $C$ is the center of the ellipse, then find area of triangle $ABC$.

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**1144.** Let $P$ be a point on the hyperbola $x^2 - y^2 = a^2$, where $a$ is a parameter, such that $P$ is nearest to the line $y = 2x$. Find the locus of $P$.

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**1145.** Let $P$ be any point on a directrix of an ellipse of eccentricity $e$, $S$ be the corresponding focus, and $C$ the center of the ellipse. The line $PC$ meets the ellipse at $A$. The angle between $PS$ and tangent a $A$ is $\alpha$ . Then $\alpha$ is equal to (a)$\tan^{-1}e$ (b) $\frac{\pi}{2}$ (c)$\tan^{-1}\left(1 - e^2\right)$ (d) none of these

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**1146.** If one of varying central conic (hyperbola) is fixed in magnitude and position, prove that the locus of the point of contact of a tangent drawn to it from a fixed point on the other axis is a parabole.

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**1147.** If a tangent of slope 2 of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is normal to the circle $x^2 + y^2 + 4x + 1 = 0$ , then the maximum value of $ab$ is 4 (b) 2 (c) 1 (d) none of these

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**1148.** If $\left(\sqrt{3}\right)bx + ay = 2ab$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then the eccentric angle of the point of contact is (a)$\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

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**1149.** The eccentricity of the conic represented by $x^2 - y^2 - 4x + 4y + 16 = 0$ is 1 (b) $\sqrt{2}$ (c) 2 (d) $\frac{1}{2}$

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**1150.** If the ellipse $\frac{x^2}{a^2 - 7} + \frac{y^2}{13 - 5a} = 1$ is inscribed in a square of side length $\sqrt{2a}$ , then $a$ is equal to (a)$\frac{6}{5}$ (b) $\left(-\infty, -\sqrt{7}\right) \cup \left(\sqrt{7}, \frac{13}{5}\right)$ (c) $\left(-\infty, -\sqrt{7}\right) \cup \left(\frac{13}{5}, \sqrt{7}, \right)$ (d)no such a exists

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**1151.** The curve for which the length of the normal is equal to the length of the radius vector is/are (a) circles (b) rectangular hyperbola (c) ellipses (d) straight lines

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**1152.** The locus of the point of intersection of the tangent at the endpoints of the focal chord of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1(b < a)$(a) is a an circle (b) ellipse (c) hyperbola (d) pair of straight lines

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**1153.** A tangent drawn to hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $P\left(\frac{\pi}{6}\right)$ froms a triangle of area $3a^2$ square units, with the coordinate axes, then the square of its eccentricity is (A) $15$ (B) $24$ (C) $17$ (D) $14$

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**1154.** The normal at a variable point $P$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ of eccentricity $e$ meets the axes of the ellipse at $QandR^{.}$ Then the locus of the midpoint of $QR$ is a conic with eccentricity $e'$ such that $e^{'}$ is independent of $e$ (b) $e^{'} = 1$ $e^{'} = e$ (d) $e^{'} = \frac{1}{e}$

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**1155.** If the distance between the foci and the distance between the two directricies of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are in the ratio 3:2, then $b:a$ is

(a)$1:\sqrt{2}$ (b) $\sqrt{3}:\sqrt{2}$ (c)$1:2$ (d) $2:1$

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**1156.** Any ordinate $MP$ of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ meets the auxiliary circle at $\dot{Q}$ Then locus of the point of intersection of normals at $PandQ$ to the respective curves is (a)$x^2 + y^2 = 8$ (b) $x^2 + y^2 = 34$ (c)$x^2 + y^2 = 64$ (d) $x^2 + y^2 = 15$

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**1157.** If the distance between two parallel tangents drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{49} = 1$ is 2, then their slope is equal to

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**1158.** The number of distinct normal lines that can be drawn to the ellipse $\frac{x^2}{169} + \frac{y^2}{25} = 1$ from the point $P(0, 6)$ is (A) one (B) two (C) three (D) four

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**1159.** An ellipse has point $(1, -1) and (2, -1)$ as its foci and $x + y - 5 = 0$ as one of its tangents. Then the point where this line touches the ellipse is (a) $\left(\frac{32}{9}, \frac{22}{9}\right)$ (b) $\left(\frac{23}{9}, \frac{2}{9}\right)$ (c) $\left(\frac{34}{9}, \frac{11}{9}\right)$ (d) none of these

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**1160.** Find the equation of the transverse axis of the hyperbola $(x - 3)^2 + (y + 1)^2 = (4x + 3y)^2$

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**1161.** Find the values of $a$ for which three distinct chords drawn from $(a, 0)$ to the ellipse $x^2 + 2y^2 = 1$ are bisected by the parabola $y^2 = 4x$

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**1162.** If a variable line has its intercepts on the coordinate axes $eande'$, where $\frac{e}{2}ande\overline{□}2$ are the eccentricities of a hyperbola and its conjugate hyperbola, then the line always touches the circle $x^2 + y^2 = r^2$, where $r =$ 1 (b) 2 (c) 3 (d) cannot be decided

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**1163.** Prove that if any tangent to the ellipse is cut by the tangents at the endpoints of the major axis at $TandT'$, then the circle whose diameter is ⊤ ' will pass through the foci of the ellipse.

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**1164.** A straight line has its extremities on two fixed straight lines and cuts off from them a triangle of constant area $c^{2^{\cdot}}$ Then the locus of the middle point of the line is (a)$2xy = c^2$ (b) $xy + c^2 = 0$ (c)$4x^2y^2 = c$ (d) none of these

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**1165.** A circle concentric with the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and passes through the foci $F_1 and F_2$ of the ellipse. Two curves intersect at four points. Let $P$ be any point of intersection. If the major axis of the ellipse is 15 and the area of triangle $PF_1F_2$ is 26, then find the value of $4a^2 - 4b^{2^{\cdot}}$

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**1166.** The length of the transverse axis of the rectangular hyperbola $xy = 18$ is 6 (b) 12 (c) 18 (d) 9

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**1167.** If $P$ is any point on ellipse with foci $S_1 \& S_2$ and eccentricity is $\frac{1}{2}$ such that $\angle PS_1S_2 = \alpha, \angle PS_2S_1 = \beta, \angle S_1PS_2 = \gamma$, then $\cot\left(\frac{\alpha}{2}\right), \cot\left(\frac{\gamma}{2}\right), \cot\left(\frac{\beta}{2}\right)$ are in

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**1168.** The locus of the point which is such that the chord of contact of tangents drawn from it to the ellipse $\frac{x^2}{A^2} + \frac{y^2}{b^2} = 1$ forms a triangle of constant area with the coordinate axes is

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**1169.** Find the range of eccentricity of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, (where a > b) such that the line segment joining the foci does not subtend a right angle at any point on the ellipse.

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**1170.** The angle between the lines joining origin to the points of intersection of the line $\sqrt{3}x + y = 2$ and the curve $y^2 - x^2 = 4$ is (A) $\tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$ (B) $\frac{\pi}{6}$ (C) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (D) $\frac{\pi}{2}$

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**1171.** the equation of the chord of contact of the pair of tangents drawn to the ellipse $4x^2 + 9y^2 = 36$ from the point $(m, n)$ where $mn = m + n, m, n$ being nonzero positive integers, is (a)$2x + 9y = 18$ (b) $2x + 2y = 1$ (c) $4x + 9y = 18$ (d) none of these

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**1172.** The equation to the chord joining two points $\left(x_1, y_1\right)$ and $\left(x_2, y_2\right)$ 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) $\frac{x}{y_1 - y_2} + \frac{y}{x_1 - x_2} = 1$

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**1173.** The equation of the line passing through the center and bisecting the chord $7x + y - 1 = 0$ of the ellipse $\frac{x^2}{1} + \frac{y^2}{7} = 1$ is (a)$x = y$ (b) $2x = y$ (c) $x = 2y$ (d) $x + y = 0$

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**1174.** If $P\left(x_1, y_1\right), Q\left(x_2, y_2\right), R\left(x_3, y_3\right)$ and $S\left(x_4, y_4\right)$ are four concyclic points on the rectangular hyperbola and $xy = c^2$ , then coordinates of the orthocentre ofthe triangle $PQR$ is

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**1175.** Let $P$ be any point on any directrix of an ellipse. Then the chords of contact of point $P$ with respect to the ellipse and its auxiliary circle intersect at (a)some point on the major axis depending upon the position of point $P$ (b)the midpoint of the line segment joining the center to the corresponding focus (c)the corresponding focus (d)none of these

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**1176.** Suppose the circle having equation $x^2 + y^2 = 3$ intersects the rectangular hyperbola $xy = 1$ at points $A, B, C, andD$. The equation $x^2 + y^2 - 3 + \lambda(xy - 1) = 0, \lambda \in R,$ represents. (a)a pair of lines through the origin for $\lambda = -3$ (b)an ellipse through $A, B, C, andD$ for $\lambda = -3$ (c)a parabola through $A, B, C, andD$ for $\lambda = -3$ (d)a circle for any $\lambda \in R$

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**1177.** If two points $P\&Q$ on the hyperbola ,$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ whose centre is C be such that CP is perpendicularal to $CQ$ and $a < b1$ ,then prove that $\frac{1}{CP^2} + \frac{1}{CQ^2} = \frac{1}{a^2} - \frac{1}{b^2}.$

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**1178.** The line $y = mx - \frac{\left(a^2 - b^2\right)m}{\sqrt{a^2 + b^2m^2}}$ is normal to the ellise $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ for all values of $m$ belonging to (a)$(0, 1)$ (b) $(0, \infty)$ (c) $R$ (d) none of these

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**1179.** Let C be a curve wich is the locus of the point of intersection of lines $x = 2 + m$ and $my = 4 - m$. A circle $s \equiv (x - 2)^2 + (y + 1)^2 = 25$ intersects the curve C at four points : P, Q, R and S, If O is centre of the curve C, then $OP^2 + OQ^2 + OR^2 + OS^2$ is

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**1180.** If the normals at $P(\theta)$ and $Q\left(\frac{\pi}{2} + \theta\right)$ to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ meet the major axis at $Gandg,$ respectively, then $PG^2 + Qg^2 =$ $b^2\left(1 - e^2\right)(2 - e)^2$ $a^2\left(e^4 - e^2 + 2\right)$ $a^2\left(1 + e^2\right)\left(2 + e^2\right)$ $b^2\left(1 + e^2\right)\left(2 + e^2\right)$

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**1181.** The ellipse $4x^2 + 9y^2 = 36$ and the hyperbola $a^2x^2 - y^2 = 4$ intersect at right angles. Then the equation of the circle through the points of intersection of two conics is

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**1182.** If the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is inscribed in a rectangle whose length to breadth ratio is $2:1$ , then the area of the rectangle is (a)4. $\frac{a^2 + b^2}{7}$ (b) 4. $\frac{a^2 + b^2}{3}$ (c)12. $\frac{a^2 + b^2}{5}$ (d) 8. $\frac{a^2 + b^2}{5}$

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**1183.** The chord PQ of the rectangular hyperbola $xy = a^2$ meets the x-axis at A. Point C is the midpoint of PQ and O is the origin. Prove that the triangle ACO is isosceles.

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**1184.** If tangents $PQ$ and $PR$ are drawn from a point on the circle $x^2 + y^2 = 25$ to the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1, (b < 4)$, so that the fourth vertex $S$ of parallelogram $PQSR$ lies on the circumcircle of triangle $PQR$ , then the eccentricity of the ellipse is

(a) $\frac{\sqrt{5}}{4}$

(b) $\frac{\sqrt{7}}{4}$

(c) $\frac{\sqrt{7}}{2}$

(d) $\frac{\sqrt{5}}{3}$

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**1185.** The curve xy = C, (c gt 0), and the circle $x^2 + y^2 = 1$ touch at two points. Then the distance between the points of contacts is

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**1186.** An ellipse is sliding along the coordinate axes. If the foci of the ellipse are (1, 1) and (3, 3), then the area of the director circle of the ellipse (in square units) is (a)$2\pi$ (b) $4\pi$ (c) $6\pi$ (d) $8\pi$

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**1187.** If $S_1$ and $S_2$ are the foci of the hyperbola whose length of the transverse axis is 4 and that of the conjugate axis is 6, and $S_3$ and $S_4$ are the foci of the conjugate hyperbola, then the area of quadrilateral $S_1S_3S_2S_4$ is

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**1188.** The locus of the point which is such that the chord of contact of tangents drawn from it to the ellipse $\frac{x^2}{A^2} + \frac{y^2}{b^2} = 1$ forms a triangle of constant area with the coordinate axes is

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**1189.** The equation of conjugate axis of the hyperbola $xy - 3y - 4x + 7 = 0$ is (a)$y + x = 3$ (b) $y + x = 7$ (c)$y - x = 3$ (d) none of these

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**1190.** If $SandS''$ are the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, and $P$ is any point on it, then the range of values of $SP\dot{S}'P$ is (a)$9 \leq f(\theta) \leq 16$ (b) $9 \leq f(\theta) \leq 25$ (c)$16 \leq f(\theta) \leq 25$ (d) $1 \leq f(\theta) \leq 16$

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**1191.** The asymptote of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ form with any tangent to the hyperbola a triangle whose area is $a^2 \tan\lambda$ in magnitude then find its eccentricity.

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**1192.** Let $d_1 and d_2$ be the length of the perpendiculars drawn from the foci $S and S'$ of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ to the tangent at any point $P$ on the ellipse. Then, $SP : S'P =$ (a)$d_1 : d_2$ (b) $d_2 : d_1$ (c)$d_1^2 : d_2^2$ (d) $\sqrt{d_1} : \sqrt{d_2}$

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**1193.** The asymptotes of the hyperbola $xy = hx + ky$ are (a)$x - k = 0$ and $y - h = 0$ (b)$x + h = 0$ and $y + k = 0$ (c)$x - k = 0$ and $y + h = 0$ (d)$x + k = 0$ and $y - h = 0$

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**1194.** The line $x = t$ meets the ellipse $x^2 + \frac{y^2}{9} = 1$ at real and distinct points if and only if. $|t| < 2$ (b) $|t| < 1$ $|t| > 1$ (d) none of these

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**1195.** The equation of a rectangular hyperbola whose asymptotes are x = 3 and y = 5 and passing through (7, 8) is

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**1196.** The eccentric angle of a point on the ellipse $\frac{x^2}{4} + \frac{y^2}{3} = 1$ at a distance of 5/4 units from the focus on the positive x-axis is $\cos^{-1}\left(\frac{3}{4}\right)$ (b) $\pi - \cos^{-1}\left(\frac{3}{4}\right)$ $\pi + \cos^{-1}\left(\frac{3}{4}\right)$ (d) none of these

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**1197.** The center of a rectangular hyperbola lies on the line $y = 2x$ If one of the asymptotes is $x + y + c = 0$ , then the other asymptote is (a) $6x + 3y - 4c = 0$ (b) $3x + 6y - 5c = 0$ (c)$3x - 3y - c = 0$ (d) none of these

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**1198.** Curves $(x - 1)(y - 2) = 5$ and $(x - 1)^2 + (y + 2)^2 = r^2$ intersect at four points, A, B, C and D. If centroid of $\Delta ABC$ lies on line $y = 3x - 4$, then find the locus of point D.

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**1199.** The eccentricity of the locus of point $(3h + 2, k)$, where $(h, k)$ lies on the circle $x^2 + y^2 = 1$, is $\frac{1}{3}$ (b) $\frac{\sqrt{2}}{3}$ (c) $\frac{2\sqrt{2}}{3}$ (d) $\frac{1}{\sqrt{3}}$

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**1200.** If the foci of a hyperbola a lie on y = x and one of the asymptotes is y = 2x, then find the equation of the hyperbola, given that it passes through (3, 4).

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**1201.** The auxiliary circle of a family of ellipses passes through the origin and makes intercepts of 8 units and 6 units on the x and y-axis, respectively. If the eccentricity of all such ellipses is $\frac{1}{2}$, then find the locus of the focus.

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**1202.** A man running around a race course notes that the sum of the distances of two flagposts from him a always 10m and the distance between the flag posts is 8m. Then the area of the path he encloses in square meters is (a)$15\pi$ (b) $20\pi$ (c) $27\pi$ (d) $30\pi$

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**1203.** If tangents $OQ$ and $OR$ are dawn to variable circles having radius $r$ and the center lying on the rectangular hyperbola $xy = 1$ , then the locus of the circumcenter of triangle $OQR$ is ($O$ being the origin). (a)$xy = 4$ (b) $xy = \frac{1}{4}$ (c)$xy = 1$ (d) none of these

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**1204.** Let $SandS'$ be two foci of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . If a circle described on $SS'$ as diameter intersects the ellipse at real and distinct points, then the eccentricity$e$ of the ellipse satisfies (a)$c = \frac{1}{\sqrt{2}}$ (b) $e \in \left(\frac{1}{\sqrt{2}}, 1\right)$ (c)$e \in \left(0, \frac{1}{\sqrt{2}}\right)$ (d) none of these

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**1205.** The equation, $2x^2 + 3y^2 - 8x - 18y + 35 = K$ represents

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**1206.** If the curves $\frac{x^2}{4} + y^2 = 1$ and $\frac{x^2}{a^2} + y^2 = 1$ for a suitable value of $a$ cut on four concyclic points, the equation of the circle passing through these four points is (a)$x^2 + y^2 = 2$ (b) $x^2 + y^2 = 1$ (c)$x^2 + y^2 = 4$ (d) none of these

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**1207.** If the normal at $P$ to the rectangular hyperbola $x^2 - y^2 = 4$ meets the axes at $G$ and $gandC$ is the center of the hyperbola, then (a)$PG = PC$ (b) $Pg = PC$ (c)$PG - Pg$ (d) $Gg = 2PC$

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**1208.** Each of the four inequalities given below defines a region in the xy plane. One of these four regions does not have the following property. For any two points $\left(x_1, y_1\right)$ and $\left(x_2, y_2\right)$ in the region the point

$\left(\frac{x_1 + x_2}{2} \cdot \frac{y_1 + y_2}{2}\right)$ is also in the region. The inequality defining this region is(1)$x^2 + 2y^2 \leq 1$(2)$Max\{|x|, |y| \leq 1$(3)$x^2 - y^2 \leq 1$(4)$y^2 - x \leq 0$

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**1209.** The lines parallel to the normal to the curve $xy = 1$ is/are (a) $3x + 4y + 5 = 0$ (b) $3x - 4y + 5 = 0$ (c)$4x + 3y + 5 = 0$ (d) $3y - 4x + 5 = 0$

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**1210.** From the point (2, 2) tangent are drawn to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1.$ Then the point of contact lies in the (a)first quadrant (b) second quadrant (c)third quadrant (d) fourth quadrant

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**1211.** If the two intersecting lines intersect the hyperbola and neither of them is a tangent to it, then the number of intersecting points are

(a)1 (b) 2 (c) 3 (d) 4

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**1212.** For the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, let $n$ be the number of points on the plane through which perpendicular tangents are drawn. If $n = 1, the \neq \ = \sqrt{2}$ If `n >1,t h e n0sqrt(2)` None of these

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**1213.** The differential equation $\frac{dx}{dy} = \frac{3y}{2x}$ represents a family of hyperbolas (except when it represents a pair of lines) with eccentricity. $\sqrt{\frac{3}{5}}$ (b) $\sqrt{\frac{5}{3}}$ $\sqrt{\frac{2}{5}}$ (d) $\sqrt{\frac{5}{2}}$

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**1214.** Circle are drawn on the chords of the rectangular hyperbola $xy = 4$ parallel to the line $y = x$ as diameters. All such circles pass through two fixed points whose coordinates are $(2, 2)$ (b) $(2, -2)$ (c) $(-2, 2)$ (d) $(-2, -2)$

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**1215.** The equation $(x-\alpha)^2 + (y-\beta)^2 = k(lx + my + n)^2$ represents a parabola for $k < \left(l^2 + m^2\right)^{-1}$ an ellipse for `0(1^2+m^2)^(-1)$ap\oint \circ \leq f$ or k=0`

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**1216.** If $x, y \in R,$ then the equation $3x^4 - 2(19y + 8)x^2 + \left(361y^2 + 2\left(100 + y^4\right) + 64, = 2\left(190y + 2y^2\right)\right.$ represents in rectangular Cartesian system a/an (a)parabola (b) hyperbola (c)circle (d) ellipse

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**1217.** The equation $\left|\sqrt{x^2 + (y - 1)^2} - \sqrt{x^2 + (y + 1)^2}\right| = K$ will represent a hyperbola for (a)$K \in (0, 2)$ (b) $K \in ( - 2, 1)$ (c)$K \in (1, \infty)$ (d) $K \in (0, \infty)$

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**1218.** A variable chord of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, (b > a)$, subtends a right angle at the center of the hyperbola if this chord touches. a fixed circle concentric with the hyperbola a fixed ellipse concentric with the hyperbola a fixed hyperbola concentric with the hyperbola a fixed parabola having vertex at (0, 0).

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**1219.** For the hyperbola $9x^2 - 16y^2 - 18x + 32y - 151 = 0$,

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**1220.** For which of the hyperbolas, can we have more than one pair of perpendicular tangents? (a) $\frac{x^2}{4} - \frac{y^2}{9} = 1$ (b) $\frac{x^2}{4} - \frac{y^2}{9} = -1$ (c) $x^2 - y^2 = 4$ (d) $xy = 44$

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**1221.** If (5, 12) and (24, 7) are the foci of an ellipse passing through the origin, then find the eccentricity of the ellipse.

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**1222.** If (5, 12) and (24, 7) are the foci of a hyperbola passing through the origin, then (where e is eccentricity and LR is Latus Rectum)

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**1223.** Tangents are drawn from any point on the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ to the circle $x^2 + y^2 = 9$ . Find the locus of the midpoint of the chord of contact.

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**1224.** If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ at four points $P(x_1, y_1), Q(x_2, y_2), R(x_3, y_3),$ and $S(x_4, y_4)$, then

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**1225.** If the foci of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ coincide with the foci of $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and the eccentricity of the hyperbola is 2, then

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**1226.** The locus of a point whose chord of contact with respect to the circle $x^2 + y^2 = 4$ is a tangent to the hyperbola xy = 1 is a/an

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**1227.** The equation $\frac{x^2}{1 - r} - \frac{y^2}{1 + r} = 1, r > 1,$ represents (a)an ellipse (b) a hyperbola (c)a circle (d) none of these

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**1228.** An ellipse has eccentricity $\frac{1}{2}$ and one focus at the point $P\left(\frac{1}{2}, 1\right)$. Its one directrix is the comionand tangent nearer to the point the P to the hyperbolaof $x^2 - y^2 = 1$ and the circle $x^2 + y^2 = 1$.Find the equation of the ellipse.

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**1229.** A tangent drawn to hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at $P\left(\frac{\pi}{6}\right)$ froms a triangle of area $3a^2$ square units, with the coordinate axes, then the square of its eccentricity is (A) $15$ (B) $24$ (C) $17$ (D) $14$

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**1230.** If the eccentricity of the hyperbola $x^2 - y^2 \sec^2\alpha = 5$ is $\sqrt{3}$ times the eccentricity of the ellipse $x^2 \sec^2\alpha + y^2 = 25$, then a value of $\alpha$ is

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**1231.** If $L$ is the length of the latus rectum of the hyperbola for which $x = 3 and y = 2$ are the equations of asymptotes and which passes through the point (4, 6), then the value of $\frac{L}{\sqrt{2}}$ is_____

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**1232.** If the chord $x\cos\alpha + y\sin\alpha = p$ of the hyperbola $\frac{x^2}{16} - \frac{y^2}{18} = 1$ subtends a right angle at the center, and the diameter of the circle, concentric with the hyperbola, to which the given chord is a tangent is $d$, then the value of $\frac{d}{4}$ is________

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**1233.** If the vertex of a hyperbola bisects the distance between its centre and the corresponding focus, then the ratio of the square of its conjugate axis to the square of its transverse axis is

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**1234.** If the distance between two parallel tangents drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{49} = 1$ is 2, then their slope is equal to

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**1235.** The area of triangle formed by the tangents from the point (3, 2) to the hyperbola $x^2 - 9y^2 = 9$ and the chord of contact w.r.t. the point (3, 2) is___________

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**1236.** If a variable line has its intercepts on the coordinate axes $eande'$, where $\frac{e}{2} and \frac{e'}{2}$ are the eccentricities of a hyperbola and its conjugate hyperbola, then the line always touches the circle $x^2 + y^2 = r^2$, where $r =$

(a)1 (b) 2 (c) 3 (d) cannot be decided

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**1237.** If tangents drawn from the point $(a, 2)$ to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ are perpendicular, then the value of $a^2$ is ____

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**1238.** If the hyperbola $x^2 - y^2 = 4$ is rotated by $45^0$ in the anticlockwise direction about its center keeping the axis intact, then the equation of the hyperbola is $xy = a^2$, where $a^2$ is equal to__________

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**1239.** Find the point on the hyperbola $\frac{x^2}{24} - \frac{y^2}{18} = 1$ which is nearest to the line $3x + 2y + 1 = 0$ and compute the distance between the point and the line.

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**1240.** The number of possible tangents which can be drawn to the curve $4x^2 - 9y^2 = 36$, which are perpendicular to the straight line $5x + 2y - 10 = 0$, is (A) 0 (B) 1 (C) 2 (D) 4

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**1241.** 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

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**1242.** If the angle between the asymptotes of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is $120^0$ and the product of perpendiculars drawn from the foci upon its any tangent is 9, then the locus of the point of intersection of perpendicular tangents of the hyperbola can be (a)$x^2 + y^2 = 6$ (b) $x^2 + y^2 = 9$ (c) $x^2 + y^2 = 3$ (d) $x^2 + y^2 = 18$

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**1243.** The sides $ACandAB$ of a $ABC$ touch the conjugate hyperbola of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ . If the vertex $A$ lies on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then the side $BC$ must touch (a)parabola (b) circle (c)hyperbola (d) ellipse

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**1244.** The tangent at a point P on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ passes through the point (0, -b) and the normal at P passes through the point $\left(2a\sqrt{2}, 0\right)$. Then the eccentricity of the hyperbola is

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**1245.** If $ax + by = 1$ is tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1,$ then $a^2 - b^2$ is equal to

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**1246.** The locus of a point whose chord of contact with respect to the circle $x^2 + y^2 = 4$ is a tangent to the hyperbola xy = 1 is a/an

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**1247.** The locus of the feet of the perpendiculars drawn from either focus on a variable tangent to the hyperbola $16y^2 - 9x^2 = 1$ is

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**1248.** The locus of the foot of the perpendicular from the center of the hyperbola xy = 1 on a variable tangent is

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**1249.** If the line $2x + \sqrt{6}y = 2$ touches the hyperbola $x^2 - 2y^2 = 4$, then the point of contact is

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**1250.** Which of the following is independent of $\alpha$ in the hyperbola $\left(0 < \alpha < \frac{\pi}{2}\right)\frac{x^2}{\cos^2\alpha} - \frac{y^2}{\sin^2\alpha} = 1$

A. eccentricity

B. abscissa of foci

C. directrix

D. vertex

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**1251.** Consider the graphs of $y = Ax^2$ and $y^2 + 3 = x^2 + 4y$, where A is a positive constant $x, y \in R$. The number of points in which the two graphs intersect is ________.

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**1252.** Tangents are drawn from the point $(\alpha, \beta)$ to the hyperbola $3x^2 - 2y^2 = 6$ and are inclined atv angle $\theta$ and $\phi$ to the x-axis.If $\tan\theta.\tan\phi = 2$, prove that $\beta^2 = 2\alpha^2 - 7$.

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1253. The eccentricity of the hyperbola $\left|\sqrt{(x-3)^2+(y-2)^2}-\sqrt{(x+1)^2+(y+1)^2}\right|=1$ is _____

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1254. If $y = mx + c$ is tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, having eccentricity 5, then the least positive integral value of $m$ is____

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1255. $A(-2, 0)$ and $B(2, 0)$ are two fixed points and P 1s a point such that $PA - PB = 2$ Let S be the circle $x^2 + y^2 = r^2$ , then match the following. If $r = 2$, then the number of points P satisfying $PA - PB = 2$ and lying on $x^2 + y^2 = r^2$ is

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