MATHS

BOOKS - CENGAGE

CIRCLE

Single Correct Answer Type

1. If a circle passes through the points where the lines $3kx - 2y - 1 = 0$ and $4x - 3y + 2 = 0$ meet the coordinate axes then $k =$

A. 1

B. -1

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

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

Answer: C

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2. All chords.of the curve $x^2 + y^2 - 10x - 4y + 4 = 0$ which make a right angle at (8,-2) pass through

A. $(2, 5)$

B. $(-2, -5)$

C. $(-5, -2)$

D. $(5, 2)$

Answer: D

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3. Let A(1, 2), B(3, 4) be two points and C(x, y) be a point such that area of ΔABC is 3 sq. units and $(x-1)(x-3)+(y-2)(y-4)=0$. Then number of positions of C, in the xy plane is

A. 2

B. 4

C. 8

D. 0

Answer: D

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4. The equation of the image of the circle $x^2 + y^2 + 16x - 24y + 183 = 0$ by the line mirror $4x + 7y + 13 = 0$ is :

A. $x^2 + y^2 + 32x - 4y + 235 = 0$

B. $x^2 + y^2 + 32x + 4y - 235 = 0$

C. $x^2 + y^2 + 32x - 4y - 235 = 0$

D. $x^2 + y^2 + 32x + 4y + 235 = 0$

Answer: D

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5. Equation of circle inscribed in $|x-a|+|y-b|=1$ is

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

B. $(x-a)^2+(y-b)^2=\frac{1}{2}$

C. $(x-a)^2+(y-b)^2=\frac{1}{\sqrt{2}}$

D. $(x-a)^2+(y-b)^2=1$

Answer: B

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6. Find the common differences of the following A.P: $2, 4, 6, 8$

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7. If a chord of a the circle $x^2 + y^2 = 32$ makes equal intercepts of length of l on the co-ordinate axes, then

A. $l < 8$

B. $l < 16$

C. $l > 8$

D. $l > 16$

Answer: A

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8. P and Q are any two points on the circle $x^2 + y^2 = 4$ such that PQ is a diameter. If α and β are the lengths of perpendiculars from P and Q on $x + y = 1$ then the maximum value of $\alpha\beta$ is

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

B. $\frac{7}{2}$

C. 1

D. 2

Answer: B

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9. about to only mathematics

A. 14

B. 15

C. 16

D. none of these

Answer: B

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10. about to only mathematics

A. 1

B. 2

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

D. 4

Answer: D

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11. The circle with equation $x^2 + y^2 = 1$ intersects the line $y = 7x + 5$ at two distinct points A and B. Let C be the point at which the positive x-axis intersects the circle. The angle ACB is

A. $\tan^{-1}\left(\frac{4}{3}\right)$

B. $\tan^{-1}\left(\frac{3}{4}\right)$

C. $\pi / 4$

D. $\tan^{-1}\left(\frac{3}{2}\right)$

Answer: C

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12. PA and PB are tangents to a circle S touching it at points A and B. C is a point on S in between A and B as shown in the figure. LCM is a tangent to S intersecting PA and PB in S at points L and M, respectively. Then the perimeter of the triangle PLM depends on o

A. A,B,C and P

B. P but not on C

C. P and C only

D. the radius of S only

Answer: B

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13. Two equal chords AB and AC of the circle $x^2 + y^2 - 6x - 8y - 24 = 0$ are drawn from the point $A(\sqrt{33} + 3, 0)$. Another chord PQ is drawn intersecting AB and AC at points R and S, respectively given that $AR = SC = 7$ and RB = AS = 3 . The value of $P\frac{R}{Q}S$ is

A. 1

B. 1.5

C. 2

D. None of these

Answer: A

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14. From a point P outside a circle with centre at C, tangents PA and PB are drawn such that $\frac{1}{(CA)^2} + \frac{1}{(PA)^2} = \frac{1}{16}$, then the length of chord AB is

A. 6

B. 8

C. 4

D. 12

Answer: B

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15. $(1, 2\sqrt{2})$ is a point on circle, $x^2 + y^2 = 9$. Which of the following is not the point on the circle at 2 units distance from $(1, 2\sqrt{2})$?

A. $(-1, 2\sqrt{2})$

B. $(2\sqrt{2}, 1)$

C. $\left(\frac{23}{9}, \frac{10\sqrt{2}}{9}\right)$

D. None of these

Answer: B

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16. inside the circles $x^2 + y^2 = 1$ there are three circles of equal radius a tangent to each other and to s the value of a equals to

A. $\sqrt{2}(\sqrt{2} - 1)$

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

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

D. $\sqrt{3}(\sqrt{3} - 1)$

Answer: B

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17. 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

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

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

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

D. none of these

Answer: B

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18. AB is a chord of $x^2 + y^2 = 4$ and P(1, 1) trisects AB. Then the length of the chord AB is (a) 1.5 units (c) 2.5 units (b) 2 units (d) 3 units

A. 1.5 units

B. 2 units

C. 2.5 units

D. 3 units

Answer: D

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19. Find the common differences of the following A.P: $5, 10, 15, 20$

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20. Check whether the following sequences are in A.P or not? $x+3, 2x+4, 3x+5, \ldots$

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21. Check whether the following sequences are in A.P or not? $z-1, z-3, z-5\ldots$

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22. Q.ys In the xy-plane, the length of the shortest path from (0.0) to (12.16) that does not go inside the circle 6) (y-8) 25 is (D) 10 (B) 10 5 (A) 10 Dps' on Circle

A. $10\sqrt{3}$

B. $10\sqrt{5}$

C. $10\sqrt{3} + \frac{5\pi}{3}$

D. $10 + 5\pi$

Answer: C

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23. Triangle ABC is right angled at A. The circle with centre A and radius AB cuts BC and AC internally at D and E respectively. If BD=20 and DC=16 then the length AC equals (A) 6sqrt21 (B) 6sqrt26 (C) 30 (D)32

A. $6\sqrt{21}$

B. $6\sqrt{26}$

C. 30

D. 32

Answer: B

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24. All chords through an external point to the circle $x^2+y^2=16$ are drawn having length l which is a positive integer. The sum of the squares of the distances from centre of circle to these chords is

A. 154

B. 124

C. 172

D. 128

Answer: A

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25. If $m(x-2)+\sqrt{1-m^2}y=3$, is tangent to a circle for all $m \in [-1, 1]$ then the radius of the circle is

A. 1.5

B. 2

C. 4.5

D. 3

Answer: D

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26. If the line $3x-4y-\lambda=0$ touches the circle $x^2+y^2-4x-8y-5=0$ at (a, b) then which of the following is not the possible value of $\lambda+a+b$?

A. 20

B. -28

C. -30

D. none of these

Answer: C

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27. The normal at the point (3, 4) on a circle cuts the circle at the point (-1,-2). Then the equation of the circle is

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

B. $x^2 + y^2 - 2x - 2y - 11 = 0$

C. $x^2 + y^2 - 2x + 2y + 12 = 0$

D. $x^2 + y^2 - 2x - 2y + 14 = 0$

Answer: B

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28. For all values of $m \in R$ the line $y - mx + m - 1 = 0$ cuts the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ at an angle

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

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

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

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

Answer: C

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29. If the line $|y| = x - \alpha$, such that $\alpha > 0$ does not meet the circle $x^2 + y^2 - 10x + 21 = 0$, then α belongs to

A. $\left(0, 5 - 2\sqrt{2}\right) \cup \left(5 + 2\sqrt{2}, \infty\right)$

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

C. $(5-2\sqrt{2}, 7)$

D. none of these

Answer: C

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30. Let C be the circle of radius unity centred at the origin. If two positive numbers x_1 and x_2 are such that the line passing through $(x_1, -1)$ and $(x_2, 1)$ is tangent to C then $x_1 \cdot x_2$

A. $x_1 x_2 = 1$

B. $x_1 x_2 = -1$

C. $x_1 + x_2 = 1$

D. $4x_1 x_2 = 1$

Answer: A

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31. A circle of radius 5 is tangent to the line $4x - 3y = 18$ at M(3, -2) and lies above the line. The equation of the circle is

A. $x^2 + y^2 - 6x + 4y - 12 = 0$

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

C. $x^2 + y^2 + 2x - 2y - 23 = 0$

D. $x^2 + y^2 + 6x + 4y - 12 = 0$

Answer: C

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32. The line $y = mx$ intersects the circle $x^2 + y^2 - 2x - 2y = 0$ and $x^2 + y^2 + 6x - 8y = 0$ at point A and B (points being other than origin). The range of m such that origin divides AB internally is

A. $-1 < m < \frac{3}{4}$

B. $m > \frac{4}{3}$ or $m < -2$

C. $-2 < m < \frac{4}{3}$

D. $m > -1$

Answer: A

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33. If $C_1 : x^2 + y^2 = (3 + 2\sqrt{2})^2$ 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

A. 1

B. 2

C. 3

D. 4

Answer: A

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34. From points on the straight line 3x-4y + 12 = 0, tangents are drawn to the circle $x^2 + y^2 = 4$. Then, the chords of contact pass through a fixed point. The slope of the chord of the circle having this fixed point as its mid-point is

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

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

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

D. none of these

Answer: D

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35. If tangent at (1, 2) to the circle $C_1 : x^2 + y^2 = 5$ intersects the circle $C_2 : x^2 + y^2 = 9$ at A and B and tangents at A and B to the second circle meet at point C, then the co- ordinates of C are given by

A. $(4, 5)$

B. $\left(\frac{9}{15}, \frac{18}{5}\right)$

C. $(4, \ -5)$

D. $\left(\frac{9}{5}, \frac{18}{5}\right)$

Answer: D

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36. AB is a line segment of length 48 cm and C is its mid-point. If three semicircles are drawn at AB, AC and CB using as diameters, then radius of the circle inscribed in the space enclosed by three semicircles is

A. $3\sqrt{2}$

B. 6

C. 8

D. 10

Answer: C

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37. Consider circles

$C_1 : x^2 + y^2 + 2x - 2y + p = 0$

$C_2 : x^2 + y^2 - 2x + 2y - p = 0$

$C_3 : x^2 + y^2 = p^2$

Statement-I: If the circle C_3 intersects C_1 orthogonally then C_2 does not represent a circle

Statement-II: If the circle C_3 intersects C_2 orthogonally then C_2 and C_3 have equal radii Then which of the following is true?

A. statement II is false and statement I is true

B. statement I is false and statement II is true

C. both the statements are false

D. both the statements are true

Answer: B

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38. Tangents drawn from point of intersection A of circles $x^2 + y^2 = 4$ and $(x - \sqrt{3})^2 + (y - 3)^2 = 4$ cut the line joinihg their centres at B and C Then triangle BAC is

A. equilateral triangle

B. right angle triangle

C. obtuse angle triangle

D. isosceles triangle and $\angle ABC = \frac{\pi}{6}$

Answer: A

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39. Suppose that two circles C_1 and C_2 in a plane have no points in common. Then

A. there is no line tangent to both C_1 and C_2

B. there are exactly four lines tangent to both C_1 and C_2

C. there are no lines tangent to both C_1 and C_2 or there are exactly two lines tangent to both C_1 and C_2

D. there are no lines tangent to both C_1 and C_2 or there are exactly four lines tangent to both C_1 and C_2

Answer: D

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40. A circle of radius 2 has its centre at (2, 0) and another circle of radius 1 has its centre at (5, 0). A line is tangent to the two circles at point in the first quadrant. The y-intercept of the tangent line is

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: B

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41. Let circle $C_1 : x^2 + (y-4)^2 = 12$ intersects circle $C_2 : (x-3)^2 + y^2 = 13$ at A and B. A quadrilateral ACBD is formed by tangents at A and B to both circles. The diameter of circumcircle of quadrilateral ACBD is

A. 4

B. 5

C. 6

D. 9.25

Answer: B

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42. Transverse common tangents are drawn from O to the two circles C_1, C_2 with 4, 2 respectively. Then the ratio of the areas of triangles formed by the tangents drawn from O to the circles C_1 and C_2 and chord of contacts of O w.r.t the circles C_1 and C_2 respectively is

A. 3 units

B. 6 units

C. 4 units

D. 5 units

Answer: C

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43. Equation of the straight line meeting the cirle with centre at origin and radius equal to 5 in two points at equal distances of 3 units from the point (3,4) is

A. $6x + 8y = 41$

B. $6x - 8y + 41 = 0$

C. $8x + 6y + 41 = 0$

D. $8x - 6y + 41 = 0$

Answer: A

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44. Two circle touch the x-axes and the line $y = mx$ they meet at (9,6) and at one more point and the product of their radus is $\frac{117}{2}$ then the value of m is

A. $2\sqrt{2}$

B. $\sqrt{2}$

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

D. none of these

Answer: A

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45. Tangents drawn from $P(1, 8)$ to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touches the circle at the points A and B, respectively. The radius of the circle which passes through the points of intersection of circles $x^2 + y^2 - 2x - 6y + 6 = 0$ and $x^2 + y^2 - 2x - 6y + 6 = 0$ the circumcircle of the and interse ΔPAB orthogonally is equal to

A. $\frac{\sqrt{73}}{4}$

B. $\frac{\sqrt{71}}{2}$

C. 3

D. 2

Answer: A

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46. If the radius of the circle touching the pair of lines $7x^2 - 18xy + 7y^2 = 0$ and the circle $x^2 + y^2 - 8x - 8y = 0$, and contained in the given circle is equal to k, then k^2 is equal to

A. 10

B. 9

C. 8

D. 7

Answer: C

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47. Equation of a circle having radius equal to twice the radius of the circle $x^2 + y^2 + (2p + 3)x + (3 - 2p)y + p - 3 = 0$ and touching it at the origin is

A. $x^2 + y^2 + 9x - 3y = 0$

B. $x^2 + y^2 - 9x + 3y = 0$

C. $x^2 + y^2 + 18x + 6y = 0$

D. $x^2 + y^2 + 18x - 6y = 0$

Answer: D

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48. Tangents PT_1, and PT_2, are drawn from a point P to the circle $x^2 + y^2 = a^2$. If the point P line $Px + qy + r = 0$, then the locus of the centre of circumcircle of the triangle PT_1T_2 is

A. $px + qy = r$

B. $(x - p)^2 + (y - q)^2 = r^2$

C. $px + qy = \frac{r}{2}$

D. $2px + 2qy + r = 0$

Answer: D

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49. An isosceles triangle with base 24 and legs 15 each is inscribed in a circle with centre at $(-1, 1)$. The locus of the centroid of that Δ is

A. $4(x^2 + y^2) + 8x - 8y - 73 = 0$

B. $2(x^2 + y^2) + 4x - 4y - 31 = 0$

C. $2(x^2 + y^2) + 4x - 4y - 21 = 0$

D. $4(x^2 + y^2) + 8x - 8y - 161 = 0$

Answer: D

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50. $x^2 + y^2 = 16$ and $x^2 + y^2 = 36$ are two circles. If P and Q move respectively on these circles such that $PQ = 4$ then the locus of mid-point of PQ is a circle of radius

A. $\sqrt{20}$

B. $\sqrt{22}$

C. $\sqrt{30}$

D. $\sqrt{32}$

Answer: B

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51. A variable line moves in such a way that the product of the perpendiculars from (4, 0) and (0, 0) is equal to 9. The locus of the feet of the perpendicular from (0, 0) upon the variable line is a circle, the square of whose radius is

A. 13

B. 15

C. 19

D. 23

Answer: A

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52. The locus of the mid-points of the chords of the circle of lines radiÃ¹s r which subtend an angle $\frac{\pi}{4}$ at any point on the circumference of the circle is a concentric circle with radius equal to

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

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

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

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

Answer: C

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53. Tangents PA and PB are drawn to the circle $x^2 + y^2 = 8$ from any arbitrary point P on the line $x + y = 4$. The locus of mid-point of chord of contact AB is

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

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

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

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

Answer: A

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54. The locus of the centre of a circle which cuts a given circle orthogonally and also touches a given straight line is (a) circle (c) parabola (b) line (d) ellipse

A. circle

B. line

C. parabola

D. ellipse

Answer: C

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55. 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 $P and Q$. The region in which the point of intersection of the tangents to the circle at points P and Q lies is represented by (a)$y^2 \geq 4(ax - a^2)$ (b) $y^2 \leq 4(ax - a^2)$ (c) $y \geq 4(ax - a^2)$ (d) $y \leq 4(ax - a^2)$

A. $y^2 \geq 4a(x - a)$

B. $y^2 \leq 4ax$

C. $x^2 + y^2 \leq 4a^2$

D. $x^2 - y^2 \geq a^2$

Answer: A

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56. Find the locus of the point at which two given portions of the straight line subtend equal angle.

A. a straihght line

B. a circle

C. a parabola

D. none of these

Answer: B

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57. The locus of the centre of the circle which bisects the circumferences of the circles $x^2 + y^2 = 4 \& x^2 + y^2 - 2x + 6y + 1 = 0$ is :

A. $2x - 6y - 15 = 0$

B. $2x + 6y + 15 = 0$

C. $2x - 6y + 15 = 0$

D. $2x + 6y - 15 = 0$

Answer: A

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58. The centre of family of circles cutting the family of circles $x^2 + y^2 + 4x\left(\lambda - \frac{3}{2}\right) + 3y\left(\lambda - \frac{4}{3}\right) - 6(\lambda + 2) = 0$ orthogonally, lies on

A. $x - y - 1 = 0$

B. $4x + 3y - 6 = 0$

C. $4x + 3y + 7 = 0$

D. $3x - 4y - 1 = 0$

Answer: B

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Multiple Correct Answers Type

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

A. 3

B. 4

C. -4

D. -3

Answer: A::D

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2. Consider the circle $x^2 + y^2 - 8x - 18y + 93 = 0$ with the center C and a point $P(2, 5)$ out side it. From P a pair of tangents PQ and PR are drawn to the circle with S as mid point of QR. The line joining P to C intersects the given circle at A and B. Which of the following hold (s)

A. CP is the arithmetic mean of AP and BP

B. PR is the geometric mean of PS and PC

C. PS is the harmonic mean of PA and PB

D. The angle between the two tangents from P is $\tan^{-1}\left(\frac{4}{3}\right)$

Answer: A::B::C::D

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3. Consider two circles $C_1 : x^2 + y^2 - 1 = 0$ and $C_2 : x^2 + y^2 - 2 = 0$. Let A(1,0) be a fixed point on the circle C_1 and B be any variable point on the circle C_2. The line BA meets the curve C_2 again at C. Which of the following alternative(s) is/are correct?

A. $OA^2 + OB^2 + BC^2 \in [7, 11]$, where O is the origin

B. $OA^2 + OB^2 + BC^2 \in [4, 7]$, where O is the origin

C. Locus of midpoint of AB is a circle of radius $\frac{1}{\sqrt{2}}$

D. Locus of midpoint of AB is a circle of area $\frac{\pi}{2}$

Answer: A::C

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4. The real numbers a and b are distinct. Consider the circles

$\omega_1 : (x - a)^2 + (y - b)^2 = a^2 + b^2$ and

$\omega_2 : (x - b)^2 + (y - a)^2 = a^2 + b^2$

Which of the following is (are) true?

A. The line $y = x$ is an axis of symmetry for the circles

B. The circles intersect at the origin and a point, P(say), which lies on the line $y = x$

C. The line $y = x$ is the radical axis of the pair of circles.

D. The circles are orthogonal for all $a \neq b$.

Answer: A::B::C

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5. Consider two circles $S, = x^2 + y^2 + 8x = 0$ and $S_2 = x^2 + y^2 - 2x = 0$. Let ΔPOR be formed by the common tangents to circles S_1 and S_2, Then which of the following hold(s) good?

A. Incentre of ΔPQR is (1,0)

B. The equation of radical axis of circles S_1 and S_2 is $y = 0$

C. Product of slope of direct common tangents is $\frac{16}{9}$

D. If transverse common tangent intersects direct common tangents at points A and B, then AB equals 4.

Answer: A::D

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6. A circle touching the line $x+y-2=0$ at (1,1) and cuts the circle $x^2+y^2+4x+5y-6=0$ at P and Q. Then

A. PQ can never be parallel to the given line $x+y-2=0$

B. PQ can never be perpendicular to the given line $x+y-2=0$

C. PQ always passes through $(6, -4)$

D. PQ always passes through $(-6, 4)$

Answer: A::B::C

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7. A circle $S=0$ passes through the common points of family of circles $x^2+y^2+\lambda x-4y+3=0$ and $(\lambda \varepsilon R)$ has minimum area then (A) area of $S=0$ is π sq. units (C) radius of director circle of $S=0$ is 1 unit (D) $S=0$ never cuts $|2x|=1$ (B) radius of director circle of $S=0$ is $\sqrt{2}$

A. area of $S=0$ is π sq. units

B. radius of director circle of $S=0$ is $\sqrt{2}$

C. radius of director circle of $S=0$ is 1 unit

D. $S=0$ never cuts $|2x|=1$

Answer: A::B::D

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8. Q is any point on the circle $x^2+y^2=9$. QN is perpendicular from Q to the x-axis. Locus of the point of trisection of QN is

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

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

C. $9x^2 + y^2 = 9$

D. $x^2 + 9y^2 = 9$

Answer: A::D

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9. Locus of the intersection of the two straight lines passing through $(1, 0)$ and $(-1, 0)$ respectively and including an angle of 45° can be a circle with

A. curve $(1, 0)$ and radius $\sqrt{2}$

B. centre $(1, 0)$ and radius 2

C. centre $(0, 1)$ and radius $\sqrt{2}$

D. centre $(0, -1)$ and radius $\sqrt{2}$

Answer: C::D

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Comprehension Type

1. In the diagram as shown, a circle is drawn with centre C(1, 1) and radius I and a line L. The line Lis tangential to the circle at Q. Further L meet the y-axis at R and the x-axis at Pis such a way that the angle OPQ equals θ where `0 < theta

A. $(1 + \cos\theta, 1 + \sin\theta)$

B. $(\sin\theta, \cos\theta)$

C. $(1 + \sin\theta, \cos\theta)$

D. $(1 + \sin\theta, 1 + \cos\theta)$

Answer: D

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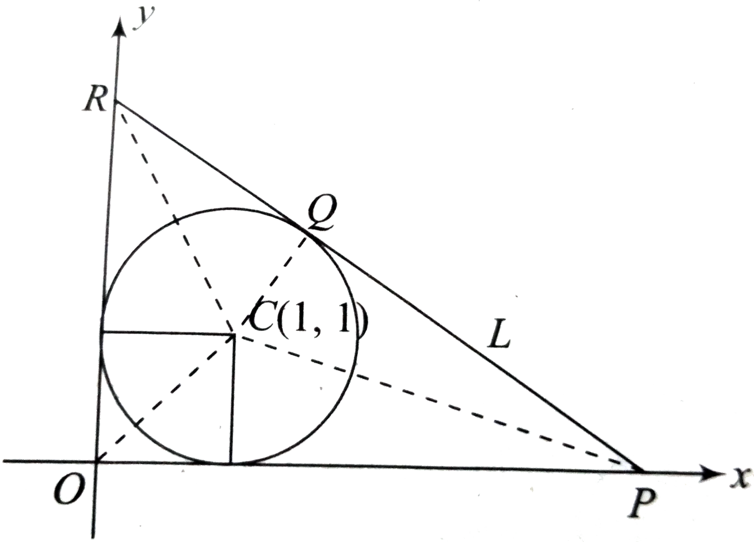

2.

In the diagram as shown, a circle is drawn with centre $C(1, 1)$ and radius 1 and a line L. The line L is tangent to the circle at Q. Further L meets the y-axis at R and the x-axis at P in such a way that the angle OPQ equals θ where $0 < \theta < \frac{\pi}{2}$.

Equation of the line PR is

A. $x\cos\theta + y\sin\theta = \sin\theta + \cos\theta + 1$

B. $x\sin\theta + y\cos\theta = \cos\theta + \sin\theta - 1$

C. $x\sin\theta + y\cos\theta = \cos\theta + \sin\theta + 1$

D. $x\tan\theta + y = 1 + \cot\left(\frac{\theta}{2}\right)$

Answer: C

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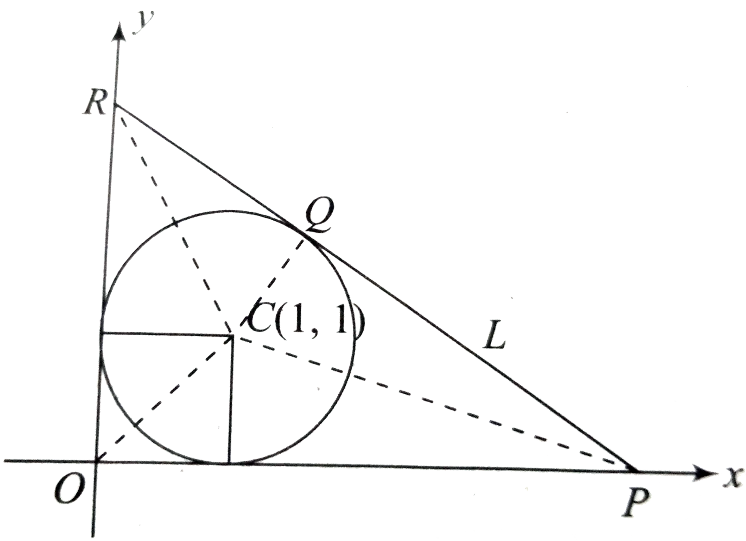

3.

In the diagram as shown, a circle is drawn with centre $C(1, 1)$ and radius 1 and a line L. The line L is tangent to the circle at Q. Further L meets the y-axis at R and the x-axis at P in such a way that the angle OPQ equals θ where $0 < \theta < \frac{\pi}{2}$.

Area of triangle OPR when $\theta = \pi / 4$ is

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

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

C. $(6 + 4\sqrt{2})$

D. none of these

Answer: B

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4. Let $P(\alpha, \beta)$ be a point in the first quadrant. Circles are drawn through P touching the coordinate axes.

Radius of one of the circles is

A. $(\sqrt{a} - \sqrt{\beta})^2$

B. $(\sqrt{\alpha} + \sqrt{\beta})^2$

C. $\alpha + \beta - \sqrt{\alpha\beta}$

D. $\alpha + \beta - \sqrt{2\alpha\beta}$

Answer: D

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5. P is a point (a, b) in the first quadrant. If the two circles which pass through P and touch both the coordinates axes cut at right angles, then

$a^2 - 6ab + b^2 = 0$ $a^2 + 2ab - b^2 = 0$ $a^2 - 4ab + b^2 = 0$

$a^2 - 8ab + b^2 = 0$

A. $\alpha^2 + \beta^2 = 4\alpha\beta$

B. $(\alpha + \beta)^2 = 4\alpha\beta$

C. $\alpha^2 + \beta^2 = \alpha\beta$

D. $\alpha^2 + \beta^2 = 2\alpha\beta$

Answer: A

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6. Let $P(\alpha, \beta)$ be a point in the first quadrant. Circles are drawn through P touching the coordinate axes.

Equation of common chord of two circles is

A. $x+y=\alpha-\beta$

B. $x+y=2\sqrt{\alpha\beta}$

C. $x+y=\alpha+\beta$

D. $\alpha^2-\beta^2=4\alpha\beta$

Answer: C

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7. $P(a, 5a)$ and $Q(4a, a)$ are two points. Two circles are drawn through these points touching the axis of y.

Centre of these circles are at

A. $(a, a), (2a, 3a)$

B. $\left(\frac{205a}{18}, \frac{29a}{3}\right), \left(\frac{5a}{2}, 3a\right)$

C. $\left(3a, \frac{29a}{3}\right), \left(\frac{205a}{9}, \frac{29a}{18}\right)$

D. None of these

Answer: B

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8. Two circles are drawn through the points $(a, 5a)$ and $(4a, a)$ to touch the y-axis. Prove that they intersect at angle $\tan^{-1}\left(\frac{40}{9}\right)$.

A. $\tan^{-1}(4/3)$

B. $\tan^{-1}(40/9)$

C. $\tan^{-1}(84/187)$

D. $\pi/4$

Answer: B

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Examples

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

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

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4. Determine the nature of the quadrilateral formed by four lines $3x + 4y - 5 = 0, 4x - 3y - 5 = 0; 3x + 4y - 5 = 0$ and $4x - 3y + 5 = 0$

Find the equation of the circle insc quadrilateral inscribed and circumscribing this quadrilateral.

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5. Two vertices of an equilateral triangle are $(-1, 0)$ and (1, 0), and its third vertex lies above the y-axis. The equation of its circumcircel is ___________

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6. 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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7. Prove that for all values of θ , 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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8. Prove that the maximum number of points with rational coordinates on a circle whose center is $(\sqrt{3}, 0)$ is two.

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9. Find the locus of the midpoint of the chords of circle $x^2 + y^2 = a^2$ having fixed length l.

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10. 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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11. 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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12. 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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14. 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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15. 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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17. 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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18. If the equation $px^2+(2-q)xy+3y^2-6qx+30y+6q=0$ represents a circle, then find the values of $pandq\cdot$

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

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20. 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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21. 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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22. A point moves so that the sum of the squares of the perpendiculars let fall from it on the sides of an equilateral triangle is constant. Prove that its locus is a circle.

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

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25. 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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26. 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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27. 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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28. 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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29. 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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30. 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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31. Tangents $PAandPB$ are drawn to $x^2 + y^2 = a^2$ from the point $P(x_1, y_1)$. Then find the equation of the circumcircle of triangle PAB.

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32. 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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33. Let P, Q, R and S be the feet of the perpendiculars drawn from point $(1, 1)$ upon the lines $y = 3x + 4, y = -3x + 6$ and their angle bisectors respectively. Then equation of the circle whose extremities of a diameter are R and S is

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

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35. Find the centre and radius of the circle whose parametric equation is $x=-1+2\cos\theta, y=3+2\sin\theta.$

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37. A circle $x^2+y^2=a^2$ meets the x-axis at A(-a,0) and B(a,0). $P(\alpha)$ and Q(β) are two points on the circle so that $\alpha-\beta=2\gamma,$ where γ is a constant. Find the locus of the point of intersection of AP and BQ.

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38. P is the variable point on the circle with center at $C\dot{C}A$ 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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39. Prove that quadrilateral $ABCD$, where $AB \equiv x + y - 10, BC \equiv x - 7y + 50 = 0, CD \equiv 22x - 4y + 125 = 0, an$ is concyclic. Also find the equation of the circumcircle of $ABCD$.

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40. Find the values of α 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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41. 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.

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42. Find the area of the region in which the points satisfy the inequaties `40`

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43. 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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44. 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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46. 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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47. The range of parameter $'a'$ for which the variable line $y = 2x + a$ lies between the circles $x^2 + y^2 - 2x - 2y + 1 = 0$ and

$x^2 + y^2 - 16x - 2y + 61 = 0$ without intersecting or touching either circle is $a \in \left(2\sqrt{5} - 15, 0\right)$ $a \in \left(- \infty, 2\sqrt{5} - 15, \right)$ $a \in \left(0, \ - \sqrt{5} - 10\right)$ (d) $a \in \left(- \sqrt{5} - 1, \infty\right)$

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48. Let $A \equiv (- 1, 0), B \equiv (3, 0),$ and PQ be any line passing through (4, 1) having slope m. Find the range of m for which there exist two points on PQ at which AB subtends a right angle.

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49. 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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50. 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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51. 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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52. C_1 and C_2 are two concentrate circles, the radius of C_2 being twice that of C_1. From a point P on C_2 tangents PA and PB are drawn to C_1. Prove that the centroid of the ΔPAB lies on C_1

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

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54. 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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55. If the lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ cut the coordinae axes at concyclic points, then prove that $|a_1a_2| = |b_1b_2|$

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57. 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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58. Find the equation of chord of the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ passing through the point (2,3) which has shortest length.

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59. A variable chord of circle $x^2 + y^2 + 2gx + 2fy + c = 0$ passes through the point $P(x_1, y_1)$. Find the locus of the midpoint of the chord.

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60. 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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61. 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 θ with the positive x-axis.

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62. The circle $x^2 + y^2 - 4x + 6y + c = 0$ touches x axis if

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63. Two parallel tangents to a given circle are cut by a third tangent at the point $RandQ$. Show that the lines from $RandQ$ to the center of the circle are mutually perpendicular.

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64. 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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65. Prove that the line $y = m(x - 1) + 3\sqrt{1 + m^2} - 2$ touches the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ for all reacl values of m.

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66. 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 θ with the positive x-axis.

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67. 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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68. Find the equation of tangents to circle $x^2+y^2-2x+4y-4=0$ drawn from point P(2,3).

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69. Tangents drawn from point P to the circle $x^2 + y^2 = 16$ make the angles θ_1 and θ_2 with positive x-axis. Find the locus of point P such that $(\tan\theta_1 - \tan\theta_2) = c$ (constant) .

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70. Find the equation of pair of tangenst drawn to circle $x^2 + y^2 - 2x + 4y - 4 = 0$ from point P(-2,3). Also find the angle between tangest.

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71. 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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72. 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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73. Tangents are drawn to $x^2 + y^2 = 1$ from any arbitrary point P on the line $2x + y - 4 = 0$.Prove that corresponding chords of contact pass through a fixed point and find that point.

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

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76. 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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77. 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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78. Find the equation of radical axis of the circles $x^2 + y^2 - 3x + 5y - 7 = 0$ and $2x^2 + 2y^2 - 4x + 8y - 13 = 0.$

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79. 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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81. 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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82. If two circles $x^2 + y^2 + c^2 = 2ax$ and $x^2 + y^2 + c^2 - 2by = 0$ touch each other externally , then prove that $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$

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

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84. Equation of the smaller circle that touches the circle $x^2 + y^2 = 1$ and passes through the point (4,3) is

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85. If a circle Passes through a point (1,2) and cut the circle $x^2 + y^2 = 4$ orthogonally,Then the locus of its centre is

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86. Find the locus of the center of the circle touching the circle $x^2 + y^2 - 4y = 4$ internally and tangents on which from (1, 2) are making of 60^0 with each other.

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88. The locus of the centers of 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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89. 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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90. Two circles passing through $A(1, 2), B(2, 1)$ touch the line $4x + 8y - 7 = 0$ at C and D such that ACED in a parallelogram. Then: coordinates of E are

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91. 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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92. Tangents are drawn to the circle $x^2 + y^2 = 9$ at the points where it is met by the circle $x^2 + y^2 + 3x + 4y + 2 = 0$. Fin the point of intersection of these tangents.

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93. 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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94. If θ 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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95. 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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96. Prove that the equation $x^2 + y^2 - 2x - 2ay - 8 = 0, a \in R$ represents the family of circles passing through two fixed points on x-axis.

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97. Find the equation of the circle passing throught (1,1) and the points of intersection of the circles $x^2 + y^2 + 13x - 3y = 0$ and $2x^2 + 2y^2 + 4x - 7y - 25 = 0$

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98. 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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99. The equation of the cirele which passes through the point (1, 1) and touches the circle $x^2 + y^2 + 4x - 6y - 3 = 0$ at the point (2, 3) on it is

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100. consider a family of circles passing through two fixed points $S(3, 7)$ and $B(6, 5)$. If the common chords of the circle

$x^2 + y^2 - 4x - 6y - 3 = 0$ and the members of the family of circles pass through a fixed point (a,b), then

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101. If $C_1, C_2, and C_3$ belong to a family of circles through the points $(x_1, y_2) and (x_2, y_2)$ prove that the ratio of the length of the tangents from any point on C_1 to the circles $C_2 and C_3$ is constant.

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102. The line $Ax + By + C = 0$ cuts the circle $x^2 + y^2 + ax + by + c = 0$ at $P and Q$. The line $A'x + B'x + C' = 0$ cuts the circle $x^2 + y^2 + a'x + b'y + c' = 0$ at $R and S$. If $P, Q, R,$ and S are concyclic, then show that $|a - a'b - b'c - c'ABCA'B'C'| = 0$

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

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105. 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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106. 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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107. 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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108. $AandB$ 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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111. Let a circle be given by $2x(x-1)+y(2y-b)=0, (a \ne 0, b \ne 0)$. Find the condition on $aandb$ if two chords each bisected by the x-axis, can be drawn to the circle from $\left(a, \frac{b}{2}\right)$

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113. For the circle $x^2 + y^2 = r^2$, find the value of r for which the area enclosed by the tangents drawn from the point P(6,8) to the circle and the chord of contact and the chord of contact is maximum.

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114. 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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Exercise 4.1

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

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

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

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4. $2x + y = 0$ is the equation of a diameter of the circle which touches the lines $4x - 3y + 10 = 0$ and $4x - 3y - 30 = 0.$ The centre and radius of the circle are

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5. 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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6. 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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7. 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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8. 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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9. Find the length of intercept, the circle $x^2 + y^2 + 10x - 6y + 9 = 0$ makes on the x-axis.

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10. 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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11. Prove that the locus of the point that moves such that the sum of the squares of its distances from the three vertices of a triangle is constant is a circle.

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12. Number of integral values of λ for which $x^2 + y^2 + 7x + (1 - \lambda)y + 5 = 0$ represents the equation of a circle whose radius cannot exceed 5 is

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13. 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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14. 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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Exercise 4.2

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

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

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3. 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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4. 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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5. 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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Exercise 4.3

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

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2. 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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4. The locus of centre of a circle which passes through the origin and cuts off a length of 4 units on the line $x=3$ is

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5. The least distance of the line $8x - 4y + 73 = 0$ from the circle $16x^2 + 16y^2 + 48x - 8y - 43 = 0$ is

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6. 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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7. The length of the tangent from any point on the circle to the circle $(x-3)^2 + (y+2)^2 = 5r^2$ to the circle $(x-3)^2 + (y+2)^2 = r^2$ is 4 units. Then the area between the circles is

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8. 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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9. 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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10. 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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11. The equation of chord AB of the circle $x^2 + y^2 = r^2$ passing through the point P(1,1) such that $\frac{PB}{PA} = \frac{\sqrt{2} + r}{\sqrt{2} - r}, (0 < r < \sqrt{2})$

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12. 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 λ is

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13. 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 $AandC\cdot$

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14. If the circle $x^2 + y^2 - 4x - 8y - 5 = 0$ intersects the line $3x - 4y = m$ at two distinct points, then find the values of m.

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15. (C) 2 45. 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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16. 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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17. 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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Exercise 4.4

1. 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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2. 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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3. If the line $lx + my + n = 0$ is tangent to the circle $x^2 + y^2 = a^2$, then find the condition.

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4. A pair of tangents are drawn from the origin to the circle $x^2 + y^2 + 20x + 20y + 20 = 0$, The equation of pair of tangent is

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6. If the tangent at $(3, -4)$ to the circle $x^2 + y^2 - 4x + 2y - 5 = 0$ cuts the circle $x^2 + y^2 + 16x + 2y + 10 = 0$ in A and B then the midpoint of AB is

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7. 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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9. 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 λ

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11. 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 $BandC$. Find the locus of the circumcenter of ABC.

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13. The point of which the line $9x + y - 28 = 0$ is the chord of contact of the circle $2x^2 + 2y^2 - 3x + 5y - 7 = 0$ is

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14. Find the equation of the normal to the circle $x^2 + y^2 = 9$ at the point $(1/\sqrt{2}, 1/\sqrt{2})$.

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Exercise 4.5

1. How the following pair of circles are situated in the plane ? Als, find the number of common tangents . $(i) x^2 + (y-1)^2 = 9$ and $(x-1)^2 + y^2 = 25$ (ii) $x^2 + y^2 - 12x - 12y = 0$ and $x^2 + y^2 + 6x + 6y = 0$

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

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3. Circles of radius 5 units intersects the circle $(x-1)^2+(x-2)^2=9$ in a such a way that the length of the common chord is of maximum length. If the slope of common chord is $\frac{3}{4}$, then find the centre of the circle.

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5. Let two parallel lines L_1 and L_2 with positive slope are tangent to the circle $C_1 : x^2 + y^2 - 2x16y + 64 = 0$. If L_1 is also tangent to the circle $C_2 : x^2 + y^2 - 2x + 2y - 2 = 0$ and the equation of L_2 is $a\sqrt{a}x - by + c - a\sqrt{a} = 0$ where a,b,c in N. then find the value of $\frac{a+b+c}{7}$

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7. 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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8. 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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9. Find the equation of the circle whose radius is 3 and which touches internally the circle $x^2 + y^2 - 4x - 6y = -12 = 0$ at the point $(-1, -1)$.

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10. Two circles with radii $a and b$ touch each other externally such that θ 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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11. 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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Exercise 4.6

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

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3. 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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5. 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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Exercise (Single)

1. 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 (π, e) is a)at most one b) at least two c)exactly two d) infinite

A. at most one

B. at least two

C. exactly two

D. inifinite

Answer: 1

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2. The radius of the circle which has normals $xy - 2x - y + 2 = 0$ and a tangent $3x + 4y - 6 = 0$ 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. $(x - 3)^2 + (y - 4)^2 = 5$

Answer: 1

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

B. $x^2 + y^2 - 4x - 6y - 36 = 0$

C. $x^2 + y^2 - 4x - 6y - 24 = 0$

D. x^(2)+y^(2)-4x-6y-15=0`

Answer: 2

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4. 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 $8\sqrt{3}squnits$ (b) $4\sqrt{3}squnits$ $6\sqrt{3}squnits$ (d) none of these

A. $8\sqrt{3}$ sq. units

B. $4\sqrt{3}$ sq. units

C. $6\sqrt{3}$ sq. units

D. none of these

Answer: 1

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

A. $2x - 5y + 11 = 0$

B. $2x + 5y - 11 = 0$

C. $2x + 5y + 11 = 0$

D. none of these

Answer: 1

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6. 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

A. $k \geq \frac{1}{2}$

B. $-\frac{1}{2} \leq k \leq \frac{1}{2}$

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

D. $0 < k < \frac{1}{2}$

Answer: 1

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7. 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.

A. $3\sqrt{5}$

B. $5\sqrt{3}$

C. $2\sqrt{5}$

D. $5\sqrt{20}$

Answer: A

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8. A right angled isosceles triangle is inscribed in the circle $x^2 + y^2 - 4x - 2y - 4 = 0$ then length of its side is

A. $3\sqrt{2}$

B. $2\sqrt{2}$

C. $\sqrt{2}$

D. $4\sqrt{2}$

Answer: 1

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9. $f(x, y) = x^2 + y^2 + 2ax + 2by + c = 0$ 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

A. $(2, 5/2)$

B. Data are not sufficient

C. $(-2, -5/2)$

D. Data are inconsistent.

Answer: 3

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10. 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) $4(x^2+y^2)=g^2+f^2$ (b) $4(x^2+y^2)=8gx+8fy=(1-g)(1+3g)+(1-f)(1+3f)$ (c) $4(x^2+y^2)=8gx+8fy=g^2+f^2$ (d) none of these

A. $4(x^2+y^2)=g^2+f^2$

B. $4(x^2+y^2)+8gx+8fy=(1-g)(1+3g)+(1-f)(1+3f)$

C. $4(x^2+y^2)+8gx+8fy=g^2+f^2$

D. none of these

Answer: 2

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11. If it is possible to draw a triangle which circumscribes the circle $(x-(a-2b))^2+(y-(a+b))^2=1$ and is inscribed by $x^2+y^2-2x-4y+1=0$ then

A. $\beta=-\frac{1}{3}$

B. $\beta=\frac{2}{3}$

C. $\alpha = \frac{5}{3}$

D. $\alpha = -\frac{5}{2}$

Answer: 3

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12. The locus of the centre of the circle $(x\cos\alpha + y\sin\alpha - a)^2 + (x\sin\alpha - y\cos\alpha - b)^2 = k^2$ if α varies, is

A. $x^2 - y^2 = a^2 + b^2$

B. $x^2 - y^2 = a^2 b^2$

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

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

Answer: 3

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13. about to only mathematics

A. (1,0)

B. (0,1)

C. (0,-1)

D. (-1,0)

Answer: 4

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14. $ABCD$ 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) $\frac{1}{\sqrt{2}}$

A. $2-\sqrt{2}$

B. $\sqrt{2}-1$

C. $1/2$

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

Answer: 1

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15. 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 $(x^2+y^2)\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=4a^2$ $(x^2+y^2)^2\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=a^2$ $(x^2+y^2)^2\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=4a^2$ $(x^2+y^2)\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=a^2$

A. $(x^2+y^2)\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=4a^2$

B. $(x^2+y^2)^2\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=a^2$

C. $(x^2+y^2)^2\left(\frac{1}{x^2}+\frac{1}{y^2}\right)=4a^2$

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

Answer: 3

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16. The circle $x^2 + y^2 = 4$cuts the line joining the points $A(1, 0)$ and $B(3, 4)$ in two points P and Q. Let $B\frac{P}{P}A = \alpha$ and $B\frac{Q}{Q}A = \beta$. Then α and β are roots of the quadratic equation

A. $3x^2 - 16x + 21 = 0$

B. $x^2 - 8x + 7 = 0$

C. $x^2 - 9x + 8 = 0$

D. none of these

Answer: 1

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17. If a circle of radius R passes through the origin O and intersects the coordinate axes at A and B, then the locus of the foot of perpendicular from O on AB is

A. $x^2 + y^2 = (2k)^2$

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

C. $x^2 + y^2 = (4k)^2$

D. $x^2 + y^2 = (6k)^2$

Answer: 1

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18. $(6, 0), (0, 6)$ and $(7, 7)$ are the vertices of a triangle. The circle inscribed in the triangle has the equation

A. $x^2 + y^2 - 9x - 9y + 36 = 0$

B. $x^2 + y^2 + 9x - 9y + 36 = 0$

C. $x^2 + y^2 + 9x + 9y - 36 = 0$

D. $x^2 + y^2 + 18x - 18y + 36 = 0$

Answer: 2

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19. 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) $\left(\frac{3}{2}, -1\right)$ $\left(\frac{3}{4}, -\frac{1}{2}\right)$ (d) $\left(-\frac{3}{2}, 1\right)$

A. $(3, -2)$

B. $(3/2, -1)$

C. $(3/4, -1/2)$

D. $(-3/2, 1)$

Answer: 2

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20. about to only mathematics

A. 6

B. $\sqrt{(a+1)^2+(b+2)^2}$

C. 3

D. $\sqrt{(a+1)^2+(b+2)^2}-3$

Answer: 1

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21. If the conics whose equations are $S_1 : (\sin^2\theta)x^2 + (2h\tan\theta)xy + (\cos^2\theta)y^2 + 32x + 16y + 19 = 0$ $S_2 : (\cos^2\theta)x^2 - (2h'\cot\theta)xy + (\sin^2\theta)y^2 + 16x + 32y + 19 = 0$ 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

A. $h + h' = 0$

B. $h = h'$

C. $h + h' = 1$

D. none of these

Answer: 1

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22. 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)$x^2+y^2+4x-6y-12=0$

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. $x^2+y^2-4x-6y-12=0$

Answer: 1

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23. The ends of a quadrant of a circle have the coordinates (1, 3) and (3, 1). Then the center of such a circle is (2, 2) (b) (1, 1) (c) (4, 4) (d) (2, 6)

A. (2,2)

B. (1,1)

C. (4,4)

D. (2,6)

Answer: 2

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24. 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) $\left(-\frac{72}{25}, \frac{21}{25}\right)$

A. $(0, -3)$

B. $(0, 3)$

C. $(72/25, 21/25)$

D. $(-72/25, 21/25)$

Answer: 3

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25. Find the equation of the circle which touch the line 2x-y=1 at (1,1) and line 2x+y=4

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A. 1

B. 2

C. $3/2$

D. 4

Answer: 3

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27. 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 $x = 0$ (b) $24x + 7y = 0$ $7x + 24 = 0$ (d) $7x - 24y = 0$

A. $x = 0$

B. $24x + 7y = 0$

C. $7x + 24y = 0$

D. $7x - 24y = 0$

Answer: 2

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28. 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. $3x + y = 0$ and $3x - y = 0$

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

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

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

Answer: 3

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29. A region in the $x - y$ plane is bounded by the curve $y = \sqrt{25 - x^2}$ and the line $y = 0$. If the point $(a, a + 1)$ lies in the interior of the region, then

A. $a \in (- 4, 3)$

B. $a \in (-\infty, -1) \in (3, \infty)$

C. $a \in (-1, 3)$

D. none of these

Answer: 3

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30. about to only mathematics

A. 12

B. 11

C. 9

D. none of these

Answer: 2

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31. 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) $x - y - 6 = 0$

A. $2x - 2y - 3 = 0$

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

C. $x - y + 6 = 0$

D. $x - y - 6 = 0$

Answer: 1

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32. 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. 2

B. -2

C. -1

D. none of these

Answer: 3

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33. 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

A. 12

B. 15

C. 20

D. 25

Answer: 3

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34. 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) $x^2 + y^2 - 3x - 5y = 0$

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

B. $x^2 + y^2 = 36$

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

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

Answer: 4

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35. about to only mathematics

A. $(-\infty, 5\sqrt{2})$

B. $(4\sqrt{2} - \sqrt{14}, 5\sqrt{2})$

C. $(4\sqrt{2} - \sqrt{14}, 4\sqrt{2} + \sqrt{14})$

D. none of these

Answer: 2

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36. 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 $(-6, -9), (-6, 5), (8, -9), (8, 5)$

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

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

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

A. $(-6, -9), (-6, 5), (8, -9), (8, 5)$

B. $(-6, 9), (-6, -5), (8, -9), (8, 5)$

C. $(-6, -9), (-6, 5), (8, 9), (8, 5)$

D. $(-6, -9), (-6, 5), (8, -9), (8, -5)$

Answer: 1

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37. If a line passes through the point $P(1, -2)$ and cuts the $x^2 + y^2 - x - y = 0$at A and B, then the maximum of $PA + PB$ is

A. $\sqrt{26}$

B. 8

C. $\sqrt{8}$

D. $2\sqrt{8}$

Answer: 1

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38. 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 3 (b) 4 (c) 5 (d) 6

A. 3

B. 4

C. 5

D. 6

Answer: 3

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39. If (α, β) 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 α is $4 - \sqrt{2}$ (b) 6 $4 + 2\sqrt{2}$ (d) $+\sqrt{2}$

A. $4-\sqrt{2}$

B. 6

C. $4+2\sqrt{2}$

D. $4+\sqrt{2}$

Answer: 3

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40. The area bounded by the circles $x^2+y^2=1, x^2+y^2=4,$ and the pair of lines $\sqrt{3}(x^2+y^2)=4xy$ is equal to $\frac{\pi}{2}$ (b) $\frac{5\pi}{2}$ (c) 3π (d) $\frac{\pi}{4}$

A. $\pi/2$

B. $5\pi/2$

C. 3π

D. $\pi/4$

Answer: 4

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41. 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

A. 8

B. 6

C. 4

D. 2

Answer: 2

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42. 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

A. $\theta = n\pi, n \in I$

B. $A = (2n+1)\pi, n \in I$

C. $\theta = 2n\pi, n \in I$

D. none of these

Answer: 3

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43. The range of values of $\lambda, \lambda > 0$ such that the angle θ 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 $\left(\frac{4}{\sqrt{3}}, \frac{2}{\sqrt{2}}\right)$ (b) $(0, \sqrt{2})$ $(1, 2)$ (d) none of these

A. $(4/\sqrt{3}, 2\sqrt{2})$

B. $(0, \sqrt{2})$

C. $(1, 2)$

D. none of these

Answer: 1

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44. The circle which can be drawn to pass through (1, 0) and (3, 0) and to touch the y-axis intersect at angle θ. Then $\cos\theta$ is equal to (a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $-\frac{1}{4}$

A. $1/2$

B. $1/3$

C. $1/4$

D. $-1/4$

Answer: 1

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45. 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) $\frac{1}{2}$ (d) $\frac{1}{3}$

A. 2

B. 3

C. $1/2$

D. $1/3$

Answer: 3

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46. 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 $3\sqrt{3}\frac{r^2}{4}$ (b) $\frac{\sqrt{3}r^2}{4}$ $\frac{3r^2}{4}$ (d) r^2

A. $3\sqrt{3}r^2/4$

B. $\sqrt{3}r^2 / 4$

C. $3r^2 / 4$

D. r^2

Answer: 1

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47. 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) $x^2 + y^2 - ax - by - \frac{a^2 + b^2}{8} = 0$

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. $x^2 + y^2 - ax - by - \frac{a^2 + b^2}{8} = 0$

Answer: 3

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48. 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

A. 180°

B. 90°

C. 120°

D. Depends on centre and radius

Answer: 2

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

A. $\left(3\sqrt{3}\right)/2$

B. $3\sqrt{3}$

C. 3

D. $\sqrt{3}$

Answer: 2

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50. 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 $a^2=2p^2$ (b) $p^2=2a^2\ a=2p$ (d) $c^2=a^2(2m+1$

A. $a^2 = 2p^2$

B. $p^2 = 2a^2$

C. $a = 2p$

D. $p = 2a$

Answer: 1

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51. 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) $3 \leq x^2 + y^2 \leq 9$

A. $4 \leq x^2 + y^2 \leq 64$

B. $x^2 + y^2 \leq 25$

C. $x^2 + y^2 \geq 25$

D. $3 \leq x^2 + y^2 \leq 9$

Answer: 1

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52. 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

A. $x + y = 2$

B. $x - y = 2$

C. $2x - y = 1$

D. none of these

Answer: 1

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53. 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 2α . then the equation of the locus of the point P is

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

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

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

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

Answer: 4

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54. 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) $p^2>8q^2$

A. $p^2=q^2$

B. $p^2 = 8q^2$

C. $p^2 < 8q^2$

D. $p^2 > 8q^2$

Answer: 4

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

A. $\sqrt{3}$

B. $\sqrt{2}$

C. 3

D. 2

Answer: 3

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56. Through the point P(3,4) a pair of perpendicular lines are dranw which meet x-axis at the point A and B. The locus of incentre of triangle PAB is

A. $x^2 - y^2 - 6x - 8y + 25 = 0$

B. $x^2 + y^2 - 6x - 8y + 25 = 0$

C. $x^2 - y^2 + 6x + 8y + 25 = 0$

D. $x^2 + y^2 + 6x + 8y + 25 = 0$

Answer: 1

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57. 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) $bx + ay = 0$

A. $ax - by = 0$

B. $ax + by = 0$

C. $bx - ay = 0$

D. $bx + ay = 0$

Answer: 2

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58. 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) $(-6, -7)$

A. $(-6, 11)$

B. $(-9, -13)$

C. $(-10, -15)$

D. $(-6, -7)$

Answer: 4

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59. The locus of the point from which the lengths of the tangents to the circles $x^2 + y^2 = 4$ and $2(x^2 + y^2) - 10x + 3y - 2 = 0$ 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.

A. a straight line inclined at $\pi/4$ 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

Answer: 4

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60. about to only mathematics

A. 4

B. $2\sqrt{5}$

C. 5

D. $3\sqrt{5}$

Answer: 3

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61. 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) $\frac{d_1d_2}{d_1+d_2}$

A. $\dfrac{2d_1 + d_2}{2}$

B. $\dfrac{d_1 + 2d_2}{2}$

C. $d_1 + d_2$

D. $\dfrac{d_1 d_2}{d_1 + d_2}$

Answer: 3

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62. The range of values of α 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 $[1, \infty)$ (b) $[-1, \infty)$ $(0, 1)$ (d) $(-\infty, 1]$

A. $[1, \infty)$

B. $[-1, \infty)$

C. $(0, 1)$

D. $(-\infty, 1]$

Answer: 2

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63. The equation of the tangent to the circle $x^2 + y^2 = a^2$, which makes a triangle of area a^2 with the coordinate axes, is $x \pm y = a\sqrt{2}$ (b) $x \pm y = \pm a\sqrt{2}$ $x \pm y = 2a$ (d) $x + y = \pm 2a$

A. $x \pm y = \pm a$

B. $x \pm y = \pm a\sqrt{2}$

C. $x \pm y = 3a$

D. $x \pm y = \pm 2a$

Answer: 2

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64. 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 $AandB$. The locus of the point of intersection of tangents at $AandB$ 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

A. $x^2+y^2=(27/7)^2$

B. $x^2-y^2=(27/7)^2$

C. $y^2-x^2=(27/7)^2$

D. none of these

Answer: 1

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65. about to only mathematics

A. 6

B. 12

C. $6\sqrt{2}$

D. $12 - 4\sqrt{2}$

Answer: 4

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66. 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

A. 2k

B. $k/2$

C. k

D. none of these

Answer: 3

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67. 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 $a=\frac{1}{2}, b=\frac{1}{2}$ $a=\frac{1+\sqrt{7}}{2}$, $b=\frac{1+\sqrt{7}}{2}$ $a=\frac{1}{4}, b=\frac{3}{4}$ (d) $a=1, b=\sqrt{3}$

A. $a=\frac{1}{2}, b=\frac{1}{2}$

B. $a=\frac{1+\sqrt{7}}{2}, b=\frac{1-\sqrt{7}}{2}$

C. $a=\frac{1}{4}, b=\frac{3}{4}$

D. $a=1, b=\sqrt{3}$

Answer: 2

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68. 18) A light ray gets reflected from the x=-2. If the reflected ray touches the circle $x^2 + y^2 = 4$ and point of incident is (-2,-4), then equation of incident ray is A)4y + 3x + 22 = 0 B) 3y + 4x + 20 = 0 C) 4y + 2x + 20 = 0 D) y+x+6-0

A. $4y + 3x + 22 = 0$

B. $3y + 4x + 20 = 0$

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

D. $y + x + 6 = 0$

Answer: 1

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69. 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. $x^2 + y^2 = ab$

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

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

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

Answer: 1

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70. The greatest integral value of a such that $\sqrt{9 - a^2 + 2x - x^2} \geq \sqrt{16 - x^2}$ for at least one positive value of x is

(a) 3 (b) 4 (c) 6 (d) 7

A. 8

B. 7

C. 6

D. 4

Answer: 2

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71. 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

A. be concyclic

B. be collinear

C. form the vertices of a triangle

D. none of these

Answer: 2

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72. The chord of contact of tangents from a point P to a circle passes through Q. If $l_1 and l_2$ are the length of the tangents from $P and Q$ to the circle, then PQ is equal to

A. $\frac{l_1 + l_2}{2}$

B. $\frac{l_1 - l_2}{2}$

C. $\sqrt{l_1^2 + l_2^2}$

D. $2\sqrt{l_1^2 + l_2^2}$

Answer: 3

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73. 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

A. 36

B. 144

C. 72

D. none of these

Answer: 3

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74. Tangents PA and PB are drawn to the circle $x^2 + y^2 = 8$ from any arbitrary point P on the line $x + y = 4$. The locus of mid-point of chord of contact AB is

A. $25(x^2 + y^2) = 9(x + y)$

B. $25(x^2 + y^2) = 3(x + y)$

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

D. none of these

Answer: 1

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75. 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)$y^2 \geq 4(ax - a^2)$ (b) $y^2 \leq 4(ax - a^2)$ (c) $y \geq 4(ax - a^2)$ (d) $y \leq 4(ax - a^2)$

A. $y^2 \geq 4(ax - a^2)$

B. $y^2 \leq 4(ax - a^2)$

C. $y \geq 4(ax - a^2)$

D. $y = 4(ax - a^2)$

Answer: 1

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76. 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 $(m_1 + m_2)$ is

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

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

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

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

Answer: 3

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77. 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. $\frac{4ch^2}{(g^2 - c^2)}(g^2 + f^2 - c)$

B. $\frac{4ch^2}{(f^2 - c^2)}(g^2 + f^2 - c)$

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

D. none of these

Answer: 2

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78. 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.

A. $(x - 3)^2 + (y + 3)^2 = 9$

B. $(x - 3)^2 + (y + 3)^2 = 9/2$

C. $(x - 3)^2 + (y - 3)^2 = 9$

D. $(x + 3)^2 + (y - 3)^2 = 9/2$

Answer: 1

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79. 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) (d) none of these

A. $2\sqrt{2}$

B. 3

C. 4

D. none of these

Answer: 2

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80. 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) $\frac{26}{17}$

A. 2

B. 4

C. $34/13$

D. $26/17$

Answer: 1

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81. A circle C_1, of radius 2 touches both x-axis and y- axis. Another circle C_2 whose radius is greater than 2 touches circle and both the axes. Then the radius of circle is

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

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

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

D. $6 + \sqrt{3}$

Answer: 2

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

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

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

C. $x^2 + y^2 - 2x + 4y - 5 = 0$

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

Answer: 1

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83. Two circles of radii $a and b$ 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) $\frac{1}{\sqrt{2}}$

A. $1/4$

B. $1/8$

C. $1/2$

D. $1/\sqrt{2}$

Answer: 1

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84. 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 μ are (a)± 2 (b) ± 3 (c) ± 4 (d) none of these

A. ± 2

B. ± 3

C. ± 4

D. none of these

Answer: 2

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85. 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) $\frac{41}{6}$

A. $31/4$

B. $41/4$

C. $41/3$

D. 17

Answer: 2

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86. 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

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

B. $2\sqrt{2} - 1$

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

D. 1

Answer: 4

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87. P is a point (a, b) in the first quadrant. If the two circles which pass through P and touch both the coordinates axes cut at right angles, then

$a^2 - 6ab + b^2 = 0$ $a^2 + 2ab - b^2 = 0$ $a^2 - 4ab + b^2 = 0$

$a^2 - 8ab + b^2 = 0$

A. $a^2 - 6ab + b^2 = 0$

B. $a^2 + 2ab - b^2 = 0$

C. $a^2 - 4ab + b^2 = 0$

D. $a^2 - 8ab + b^2 = 0$

Answer: 3

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

A. 1

B. 2

C. 3

D. 4

Answer: 3

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89. Find the locus of the centres of the circle which cut the circles $x^2+y^2+4x-6y+9=0$ and $x^2+y^2-5x+4y-2=0$ orthogonally

A. $9x+10y-7=0$

B. $x-y+2=0$

C. $9x - 10y - 11 = 0$

D. $9x + 10y + 7 = 0$

Answer: 3

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90. 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. $2x - y + 10 = 0$

B. $x + 2y - 10 = 0$

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

D. $2x + y - 10 = 0$

Answer: 1

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91. 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 θ is (a) $\frac{5\pi}{6}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

A. $5\pi/6$

B. $2\pi/3$

C. $\pi/3$

D. $\pi/6$

Answer: 3

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92. about to only mathematics

A. 20

B. 15

C. 22

D. 27

Answer: 1

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93. The circles having radii $r_1 and r_2$ intersect orthogonally. The length of their common chord is $\frac{2r_1r_2}{\sqrt{r12 + r12}}$ (b) $\frac{\sqrt{r12 + r12}}{2r_1r_2}$ $\frac{r_1r_2}{\sqrt{r12 + r12}}$ (d) $\frac{\sqrt{r12 + r12}}{r_1r_2}$

A. $\frac{2r_1r_2}{\sqrt{r_1^2 + r_2^2}}$

B. $\frac{\sqrt{r_2^2 + r_1^2}}{2r_1r_2}$

C. $\frac{r_1r_2}{\sqrt{r_1^2 + r_2^2}}$

D. $\frac{\sqrt{r_2^2 + r_1^2}}{r_1r_2}$

Answer: 1

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94. 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 $a^2 = c^2(2m+1)$ $a^2 = c^2(2+m^2)$ $c^2 = a^2(2+m^2)$ (d) $c^2 = a^2(2m+1)$

A. $a^2 = c^2(2m+1)$

B. $a^2 = c^2(2+m^2)$

C. $c^2 = a^2(2+m^2)$

D. $c^2 = a^2(2m+1)$

Answer: 3

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95. Locus of thews of the centre of the circle which touches $x^2 + y^2 - 6x - 6y + 14 = 0$ externally and also y-axis is:

A. $x^2 - 6x - 10y - 14 = 0$

B. $x^2 - 10x - 6y - 14 = 0$

C. $y^2 - 6x - 10y + 14 = 0$

D. $y^2 - 10x - 6y + 14 = 0$

Answer: 4

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96. 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. cuts the given circle orthogonally

B. touches the given circle externally

C. touches the given circle internally

D. none of these

Answer: 1

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

A. $x = 1$

B. $y = 2$

C. $x + y = 3$

D. $x - y = 3$

Answer: 2

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98. The coordinates of two points $PandQ$ are $(x_1, y_1)and(x_2, y_2)andO$ 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) $\frac{|x_1x_2 - y_1y_2|}{PQ}$

A. $\frac{|x_1y_2 + x_2y_1|}{PQ}$

B. $\frac{|x_1y_2 - x_2y_1|}{PQ}$

C. $\frac{|x_1x_2 - y_2y_1|}{PQ}$

D. $\frac{|x_1x_2 + y_2y_1|}{PQ}$

Answer: 2

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99. If the circumference of the circle $x^2 + y^2 + 8x + 8y - b = 0$ is bisected by the circle $x^2 + y^2 - 2x + 4y + a = 0$ then $a + b =$ (A) 50 (B) 56 (C) -56 (D) -34

A. 50

B. 56

C. -56

D. -34

Answer: 3

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100. Equation of the circle which cuts the circle $x^2 + y^2 + 2x + 4y - 4 = 0$ and the lines $xy - 2x - y + 2 = 0$ orthogonally, is

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

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

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

D. none of these

Answer: 1

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101. The minimum radius of the circle which contains the three circles, $x^2 + y^2 - 4y - 5 = 0, x^2 + y^2 + 12x + 4y + 31 = 0$ and $x^2 + y^2 + 6x + 12y + 36 = 0$ is

A. $\frac{7}{18}\sqrt{900} + 3$

B. $\frac{\sqrt{845}}{9} + 4$

C. $\frac{5}{36}\sqrt{949} + 3$

D. none of these

Answer: 3

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102. A circle C_1 of radius b touches the circle $x^2 + y^2 = a^2$ externally and has its centre on the positiveX-axis; another circle C_2 of radius c touches the circle C_1, externally and has its centre on the positive x-axis. Given $a < b < c$ then three circles have a common tangent if a,b,c are in

A. AP

B. GP

C. HP

D. none of these

Answer: 2

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103. Find the locus of centre of variable circle C, that rouches the circle $x^2 + y^2 = 4$ internally and passes through the point(1,0).

A. $2ax + 2by - (a^2 + b^2 + k^2) = 0$

B. $2ax + 2by - (a^2 - b^2 + k^2) = 0$

C. $x^2 + y^2 - 3ax - 4by + (a^2 + b^2 - k^2) = 0$

D. $x^2 + y^2 - 2ax - 3by + (a^2 - b^2 - k^2) = 0$

Answer: 1

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104. The centre of the smallest circle touching the circles $x^2 + y^2 - 2y - 3 = 0$ and $x^2 + y^2 - 8x - 18y + 93 = 0$ is:

A. (3,2)

B. (4,4)

C. (2,5)

D. (2,7)

Answer: 3

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105. Two circle with radii r_1 and r_2 respectively touch each other externally. Let r_3 be the radius of a circle that touches these two circle as well as a common tangents to two circles then which of the following relation is true

A. $\frac{1}{\sqrt{a}} - \frac{1}{\sqrt{b}} = \frac{1}{\sqrt{c}}$

B. $c = \frac{2ab}{a+b}$

C. $\frac{1}{\sqrt{a}} + \frac{1}{\sqrt{b}} = \frac{1}{\sqrt{c}}$

D. $c = \frac{2ab}{\sqrt{a}+\sqrt{b}}$

Answer: 3

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106. Consider points $A(\sqrt{13}, 0)$ and $B(2\sqrt{13}, 0)$ lying on x-axis. These points are rotated anticlockwise direction about the origin through an angle of $\tan^{-1}\left(\frac{2}{3}\right)$. Let the new position of A and B be A' and B' respectively. With A' as centre and radius $2\frac{\sqrt{13}}{3}$ a circle C_1 is drawn and with B' as centre and radius $\frac{\sqrt{13}}{3}$ circle C_2, is drawn. The radical axis of C_1 and C_2 is

A. $3x + 2y = 20$

B. $3x + 2y = 10$

C. $9x + 6y = 65$

D. none of these

Answer: 3

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107. The common chord of the circle $x^2 + y^2 + 6x + 8y - 7 = 0$ and a circle passing through the origin and touching the line $y = x$ always passes through the point. $\left(-\frac{1}{2}, \frac{1}{2}\right)$ (b) (1, 1) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (d) none of these

A. $(-1/2, 1/2)$

B. $(1, 1)$

C. $(1/2, 1/2)$

D. none of these

Answer: 3

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108. If the circumference of the circle $x^2 + y^2 + 8x + 8y - b = 0$ is bisected by 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)$5x^2 + 5y^2 - 4x - 2y - 18 = 0$

Answer: 4

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109. The equation of the circle passing through the point of intersection of the circles $x^2 + y^2 - 4x - 2y = 8$ and $x^2 + y^2 - 2x - 4y = 8$ and the point $(-1, 4)$ is (a) $x^2 + y^2 + 4x + 4y - 8 = 0$ (b) $x^2 + y^2 - 3x + 4y + 8 = 0$ (c) $x^2 + y^2 + x + y = 0$ (d) $x^2 + y^2 - 3x - 3y - 8 = 0$

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

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

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

D. $x^2 + y^2 - 3x - 3y - 8 = 0$

Answer: 4

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Exercise (Multiple)

1. about to only mathematics

A. $a_1 a_2 > 0$

B. $a_2 a_2 < 0$

C. $c > 0$

D. $c > 0$

Answer: 1,3

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2. 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

A. the area of quadrilateral OACB is 4

B. the radical axis for the famil of circles of $S = 0$ is $x + y = 0$

C. the smallest possible circle of the family $S=0$ is

$x+y-12x-4+38=0$

D. the coordinates of point C are (7,1)

Answer: 1,3,4

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3. 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

A. 5

B. -4

C. 4

D. -5

Answer: 2,3

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4. ABC is any triagnel inscribed in the circle $x^2+y^2=r^2$ such that A is fixed point . If the external and internal bisectors of $\angle A$ intersect the circle at D and E, respectively, then which of the following statements is true ΔADE ?

A. Its centroid is a fixed point.

B. Its circumcentre is a fixed point.

C. Its orthocentre is a fixed point.

D. none of these

Answer: 1,2,3

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5. The equation of tangents drawn from the origin to the circle $x^2+y^2-2rx-2hy+h^2=0$

A. $x = 0$

B. $y = 0$

C. $(h^2 - r^2)x - 2rhy = 0$

D. $(h^2 - r^2)x + 2hy = 0$

Answer: 1,3

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6. 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 $x_1 + x_2 + x_3 + x_4 = 0$ $y_1 + y_2 + y_3 + y_4 = 0$ $x_1x_2x_3x_4 = C^4$ $y_1y_2y_3y_4 = C^4$

A. $x_1 + x_2 + x_3 + x_4 = 0$

B. $y_1 + y_2 + y_3 + y_4 = 0$

C. $x_1x_2x_3x_4 = c^4$

D. $y_1y_2y_3y_4 = c^4$

Answer: 1,2,3,4

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7. 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 $a + b = 18$ (b) $a + b = \sqrt{2}$ $a - b = 4\sqrt{2}$ (d) $a\dot{b} = 73$

A. $a + b = 18$

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

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

D. $a.\,b = 72$

Answer: 1,3,4

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8. 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 $f^2 > c$ (b) $g^2 > 2$ $c > 0$ (d) $h = 0$

A. $f^2 < c$

B. $g^2 > c$

C. $c > 0$

D. $h = 0$

Answer: 1,2,3,4

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9. A point on the line $x = 3$ from which the tangents drawn to the circle $x^2 + y^2 = 8$ are at right angles is

A. $(2, 2\sqrt{7})$

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

C. $(2, -2\sqrt{7})$

D. $(2, -2\sqrt{5})$

Answer: 1,3

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10. about to only mathematics

A. $(4, 0)$

B. $(1 + 2\sqrt{2}, 0)$

C. $(4, 1)$

D. $(1, 2\sqrt{2})$

Answer: 2,4

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

A. $-4/3$

B. 0

C. 1

D. $4/3$

Answer: 1,4

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12. about to only mathematics

A. $(4/2, 36/5)$

B. $(-2/5, 44/5)$

C. $(6, 4)$

D. $(2, 4)$

Answer: 2,3

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13. 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) $7x + 24y = 250$

A. $4x + 3y = 25$

B. $3x + 4y = 38$

C. $24x - 7y + 125 = 0$

D. $7x + 24y = 250$

Answer: 1,3

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14. 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

A. 9

B. 4

C. 5

D. 25

Answer: 1,4

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15. 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

A. 1

B. 2

C. 3

D. 6

Answer: 1,4

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16. 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) $3x - y - 10 = 0$

A. $3x - y = 0$

B. $x + 3y = 0$

C. $x + 3y + 10 = 0$

D. $3x - y - 10 = 0$

Answer: 1,2,3,4

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17. 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) $x - 2y + 2 = 0$ (b) $x - 2y - 10 = 0$ $x - 2y - 5 = 0$ (d) $3x - y - 10 = 0$

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

B. $x - 2y - 10 = 0$

C. $x - 2y - 5 = 0$

D. $x - 2y + 10 = 0$

Answer: 2,4

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18. 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

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 contanct.

Answer: 2,3

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19. about to only mathematics

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 tangent is $5(12/5)^{1/4}$

D. are such that the length of their common chord is $5\sqrt{3/2}$

Answer: 1,2,3,4

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20. about to only mathematics

A. $y = \sqrt{3}x + 4$

B. $\sqrt{3}y = x + 4$

C. $y = \sqrt{3}x - 4$

D. $\sqrt{3}y = x - 4$

Answer: 2,4

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21. 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) $x^2+y^2-2\sqrt{2}+1=0$

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. $x^2+y^2-2\sqrt{2}+1=0$

Answer: 2,3

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22. 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. $(3/2, 1/2)$

B. $(1/2, 3/2)$

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

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

Answer: 3,4

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23. Find the equations of straight lines which pass through the intersection of the lines $x - 2y - 5 = 0, 7x + y = 50$ & divide the circumference of the circle $x^2 + y^2 = 100$ into two arcs whose lengths are in the ratio 2:1.

A. $3x + 4y - 25 = 0$

B. $4x - 3y - 25 = 0$

C. $3x + 2y - 23 = 0$

D. $2x - 3y - 11 = 0$

Answer: 1,2

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24. Two lines through $(2, 3)$ from which the circle $x^2 + y^2 = 25$ intercepts chords of length 8 units have equations

(A) $2x + 3y = 13, x + 5y = 17$

(B) $y = 3, 12x + 5y = 39$

(C) $x = 2, 9x - 11y = 51$

(D) $y = 0, 12x + 5y = 39$

A. $y = 3$

B. $12x + 5y = 39$

C. $x = 2$

D. $9x - 11y = 51$

Answer: 1,2

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25. Normal to the circle $x^2 + y^2 = 4$ divides the circle having centre at (2,4) and radius 2 in the ares of ratio $(\pi - 2) : (3\pi + 2)$. Then the normal can be

A. $y = x$

B. $y = 3x$

C. $y = 5x$

D. $y = 7x$

Answer: 1,4

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Exercise (Comprehension)

1. Each side of a square is of length 6 units and the centre of the square Is (- 1, 2). One of its diagonals is parallel to $x + y = 0$. Find the co-ordinates of the vertices of the square.

A. (1,6)

B. (5,2)

C. (1,2)

D. (4,6)

Answer: 4

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2. Each side of a square has length 4 units and its center is at (3,4). If one of the diagonals is parallel to the line $y = x$, then anser the following questions.

The radius of the circle inscribed in the triangle formed by any three vertices is

A. $2\sqrt{2}(\sqrt{2}+1)$

B. $2\sqrt{2}(\sqrt{2}-1)$

C. $2(\sqrt{2}+1)$

D. none of these

Answer: 2

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3. Each side of a square has length 4 units and its center is at (3,4). If one of the diagonals is parallel to the line $y=x$, then anser the following questions. ,brgt The radius of the circle inscribed in the triangle formed by any two vertices of the square and the center is

A. $2(\sqrt{2}-1)$

B. $2(\sqrt{2}+1)$

C. $\sqrt{2}(\sqrt{2}-1)$

D. none of these

Answer: 1

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4. Tangents PA and PB are drawn to the circle $(x-4)^2+(y-5)^2=4$ from the point P on the curve $y=\sin x$, where A and B lie on the circle. Consider the function $y=f(x)$ represented by the locus of the center of the circumcircle of triangle PAB. Then answer the following questions.

The range of $y=f(x)$ is

A. $[-2, 1]$

B. $[-1, 4]$

C. $[0, 2]$

D. $[2, 3]$

Answer: 4

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5. Tangents PA and PB are drawn to the circle $(x-4)^2+(y-5)^2=4$ from the point P on the curve $y=\sin x$, where A and B lie on the circle. Consider the function $y=f(x)$ represented by the locus of the center of the circumcircle of triangle PAB. Then answer the following questions.

The range of $y=f(x)$ is

A. 2π

B. 3π

C. π

D. not defined

Answer: 3

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6. Tangents PA and PB are drawn to the circle $(x-4)^2+(y-5)^2=4$ from the point P on the curve $y=\sin x$, where A and B lie on the circle. Consider the function $y=f(x)$ represented by the locus of the center of the circumcircle of triangle PAB. Then answer the following questions.

Which of the following is true ?

A. $f(x) = 4$ has real roots.

B. $f(x) = 1$ has real roots.

C. The range of $y = f^{-1}$ is $\left[-\frac{\pi}{4}+2, \frac{\pi}{4}+2\right]$

D. None of these

Answer: 3

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7. about to only mathematics

A. 0

B. 1

C. 2

D. infinite

Answer: 3

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8. Consider a family of circles passing through the point (3,7) and (6,5). Answer the following questions.

If each circle in the family cuts the circle $x^2 + y^2 - 4x - 6y - 3 = 0$, then all the common chords pass through the fixed point which is

A. $(1, 23)$

B. $(2, 23/2)$

C. $(-3, 3/2)$

D. none of these

Answer: 2

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9. Consider a family of circles passing through the point (3,7) and (6,5). Answer the following questions.

If the circle which belongs to the given family cuts the circle $x^2 + y^{20=29}$ orthogonally, then the center of that circle is

A. $(1/2, 3/2)$

B. $(9/2, 7/2)$

C. $(7/2, 9/2)$

D. $(3, -7/9)$

Answer: 3

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10. If $4l^2 - 5m^2 + 6l + 1 = 0$. Prove that $lx + my + 1 = 0$ touches a definite circle. Find the centre & radius of the circle.

A. $(2, 0), 3$

B. $(-3, 0), \sqrt{3}$

C. $(3, 0), \sqrt{5}$

D. none of these

Answer: 3

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11. Consider the relation $4l^2 - 5m^2 + 6l + 1 = 0$, where $l, m \in R$

Tangents PA and PB are drawn to the above fixed circle from the points P on the line $x + y - 1 = 0$. Then the chord of contact AP passes through the fixed point.

A. $(1/2, -5/2)$

B. $\left(\frac{1}{3}, 4/3\right)$

C. $(-1/2, 3/2)$

D. none of these

Answer: 1

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12. Consider the relation $4l^2 - 5m^2 + 6l + 1 = 0$, where $l, m \in R$

The number of tangents which can be drawn from the point (2,-3) to the above fixed circle are

A. 0

B. 1

C. 2

D. 1 or 2

Answer: 3

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13. A circle C whose radius is 1 unit, touches the x-axis at point A. The centre Q of C lies in first quadrant. The tangent from origin O to the circie touches it at T and a point P lies on it such that ΔOAP is a right angled triangle at A and its perimeter is 8 units. The length of QP is

A. $1/2$

B. $4/3$

C. $5/3$

D. none of these

Answer: 3

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14. A circle C whose radius is 1 unit, touches the x-axis at point A. The centre Q of C lies in first quadrant. The tangent from origin O to the circie touches it at T and a point P lies on it such that ΔOAP is a right angled triangle at A and its perimeter is 8 units. The length of QP is

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15. Find the derivative of $y = \ln 4x$

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16. P is a variable point of the line L = 0. Tangents are drawn to the circle $x^2 + y^2 = 4$ from P to touch it at Q and R. The parallelogram PQSR is completed. If $L = 2x + y - 6 = 0$, then the locus of circumcetre of $\triangle PQR$ is -

A. $2x - y = 4$

B. $2x + y = 3$

C. $x - 2y = 4$

D. $x + 2y = 3$

Answer: 2

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17. P is a variable point on the line $L=0$. Tangents are drawn to the circles $x^2+y^2=4$ from P to touch it at Q and R. The parallelogram PQSR is completed.

If $P \equiv (6,8)$, then the area of ΔQRS is

A. $\frac{3\sqrt{6}}{25}$ sq. units

B. $\frac{3\sqrt{24}}{25}$ sq. units

C. $\frac{48\sqrt{6}}{25}$ sq. units

D. $\frac{192\sqrt{6}}{25}$ sq. units

Answer: 4

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18. P is a variable point on the line $L=0$. Tangents are drawn to the circles $x^2+y^2=4$ from P to touch it at Q and R. The parallelogram PQSR is completed.

If $P \equiv (3, 4)$, then the coordinates of S are

A. $(-46/25, 63/25)$

B. $(-51/25, -68/25)$

C. $(-46/25, 68/25)$

D. $(-68/25, 51/25)$

Answer: 2

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19. To the circle $x^2 + y^2 = 4$, two tangents are drawn from $P(-4, 0)$, which touch the circle at T_1 and T_2 . A rhomus $PT_1P'T_2$ s completed.

If P is taken to be at (h,0) such that P' lies on the circle, the area of the rhombus is

A. $(-2, 0)$

B. $(2, 0)$

C. $(\sqrt{3}/2, 0)$

D. none of these

Answer: 1

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20. To the circle $x^2 + y^2 = 4$, two tangents are drawn from $P(-4, 0)$, which touch the circle at T_1 and T_2 . A rhomus $PT_1P'T_2$ s completed. If P is taken to be at (h,0) such that P' lies on the circle, the area of the rhombus is

A. $2:1$

B. $1:2$

C. $\sqrt{3}:2$

D. none of these

Answer: 4

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21. To the circle $x^2 + y^2 = 4$, two tangents are drawn from $P(-4, 0)$, which touch the circle at T_1 and T_2 . A rhomus $PT_1P'T_2$ s completed. If P is taken to be at (h,0) such that P' lies on the circle, the area of the rhombus is

A. $6\sqrt{3}$

B. $2\sqrt{3}$

C. $3\sqrt{3}$

D. none of these

Answer: 1

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22. Let α chord of a circle be that chord of the circle which subtends an angle α at the center.

If the slope of a $\pi/3$ chord of $x^2 + y^2 = 4$ is 1, then its equation is

A. $\pi/4$

B. $\pi/2$

C. $\pi/6$

D. $x + y = 1$ is not a chord

Answer: 2

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23. Let α chord of a circle be that chord of the circle which subtends an angle α at the center.

If the slope of a $\pi/3$ chord of $x^2 + y^2 = 4$ is 1, then its equation is

A. $x - y + \sqrt{6} = 0$

B. $x - y = 2\sqrt{3}$

C. $x - y = \sqrt{3}$

D. $x - y + \sqrt{3} = 0$

Answer: 1

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24. Let α chord of a circle be that chord of the circle which subtends an angle α at the center.

The distance of $2\pi/3$ chord of $x^2 + y^2 + 2x + 4y + 1 = 0$ from the center is

A. 1

B. 2

C. $\sqrt{2}$

D. $1/\sqrt{2}$

Answer: 1

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25. Two variable chords AB and BC of a circle $x^2 + y^2 = a^2$ are such that $AB = BC = a$. M and N are the midpoints of AB and BC, respectively, such that the line joining MN intersects the circles at P and Q, where P is closer to AB and O is the center of the circle.

$\angle OAB$ is

A. 30°

B. 60°

C. 45°

D. 15°

Answer: 2

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26. Two variable chords AB and BC of a circle $x^2 + y^2 = a^2$ are such that $AB = BC = a$. M and N are the midpoints of AB and BC, respectively, such that the line joining MN intersects the circles at P and Q, where P is closer to AB and O is the center of the circle.

The angle between the tangents at A and C is

A. 90°

B. 120°

C. 60°

D. 150°

Answer: 3

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27. Two variable chords AB and BC of a circle $x^2 + y^2 = a^2$ are such that $AB = BC = a$. M and N are the midpoints of AB and BC, respectively, such that the line joining MN intersects the circles at P and Q, where P is closer to AB and O is the center of the circle.

The locus of the points of intersection of tangents at A and C is

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

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

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

D. $x^2 + y^2 = 8a^2$

Answer: 3

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28. Give two circles intersecting orthogonally having the length of common chord $24/5$ units. The radius of one of the circles is 3 units. The radius of other circle is

A. 6 units

B. 4 units

C. 2 units

D. 4units

Answer: 2

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29. Give two circles intersecting orthogonally having the length of common chord $24/5$ units. The radius of one of the circles is 3 units. The angle between direct common tangents is

A. $\sin^{-1}. \frac{24}{25}$

B. $\sin^{-1}. \frac{4\sqrt{6}}{25}$

C. $\sin^{-1}. \frac{4}{5}$

D. $\sin^{-1}. \frac{12}{25}$

Answer: 2

Watch Video Solution

30. Give two circles intersecting orthogonally having the length of common chord $24/5$ units. The radius of one of the circles is 3 units. The angle between direct common tangents is

A. $\sqrt{12}$

B. $4\sqrt{3}$

C. $2\sqrt{6}$

D. $3\sqrt{6}$

Answer: 3

Watch Video Solution

31. In the given figure, there are two circles with centers A and B. The common tangent to the circles touches them, respectively,at P and Q. AR is 40cm and AB is divided by the point of contact of the circles in the ratio $5:3$ What is the ratio of the length of AB to that of BR ?

A. $1:4$

B. $2:3$

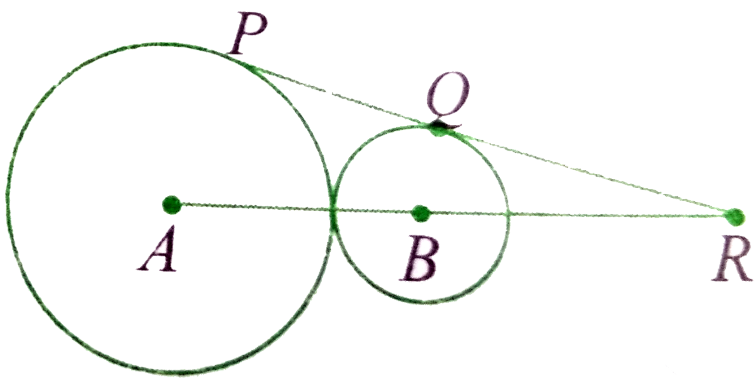
C. $2:5$

D. $7:4$

Answer: 2

Watch Video Solution

32. In the given figure, there are two circles with centers A and B. The common tangent to the circles touches them, respectively,at P and Q. AR is 40cm and AB is divided by the point of contact of the circles in the ratio $5 : 3$



The radius of the circle with center B is

A. 10 cm

B. 3 cm

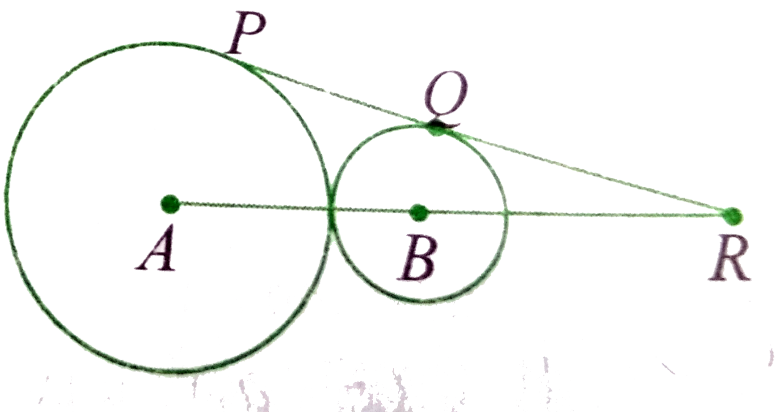
C. 6cm

D. 8cm

Answer: 3

Watch Video Solution

33. In the given figure, there are two circles with centers A and B. The common tangent to the circles touches them, respectively,at P and Q. AR is 40cm and AB is divided by the point of contact of the circles in the ratio $5:3$



The length of QR is

A. $10\sqrt{15}$ cm

B. $5\sqrt{15}cm$

C. $4\sqrt{15}$ cm

D. $6\sqrt{15}$ cm

Answer: 4

Watch Video Solution

34. Let each of the circles

$S_1 \equiv x^2 + y^2 + 4y - 1 = 0$

$S_1 \equiv x^2 + y^2 + 6x + y + 8 = 0$

$S_3 \equiv x^2 + y^2 - 4x - 4y - 37 = 0$

touch the other two. Also, let P_1, P_2 and P_3 be the points of contact of S_1 and S_2, S_2 and S_3, and S_3 , respectively, C_1, C_2 and C_3 are the centres of S_1, S_2 and S_3 respectively.

The coordinates of P_1 are

A. $(2, \ -1)$

B. $(-2, \ -1)$

C. $(-2, 1)$

D. $(2, 1)$

Answer: 2

View Text Solution

35. Let each of the circles

$S_1 \equiv x^2 + y^2 + 4y - 1 = 0$

$S_1 \equiv x^2 + y^2 + 6x + y + 8 = 0$

$S_3 \equiv x^2 + y^2 - 4x - 4y - 37 = 0$

touch the other two. Also, let P_1, P_2 and P_3 be the points of contact of S_1 and S_2, S_2 and S_3, and S_3 , respectively, C_1, C_2 and C_3 are the centres of S_1, S_2 and S_3 respectively.

The ratio $\frac{\text{area}(\Delta P_1 P_2 P_3)}{\text{area}(\Delta C_1 C_2 C_3)}$ is equal to

A. $3 : 2$

B. $2 : 3$

C. $5:3$

D. $2:5$

Answer: 4

Watch Video Solution

36. Let each of the circles

$S_1 \equiv x^2 + y^2 + 4y - 1 = 0$

$S_1 \equiv x^2 + y^2 + 6x + y + 8 = 0$

$S_3 \equiv x^2 + y^2 - 4x - 4y - 37 = 0$

touch the other two. Also, let P_1, P_2 and P_3 be the points of contact of S_1 and S_2, S_2 and S_3, and S_3 , respectively, C_1, C_2 and C_3 are the centres of S_1, S_2 and S_3 respectively.

P_2 and P_3 are images of each other with respect to the line

A. $y = x$

B. $y = \; - x$

C. $y = x + 1$

D. $y = -x + 2$

Answer: 1

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37. The line $x + 2y = a$ intersects the circle $x^2 + y^2 = 4$ at two distinct points A and B Another line $12x - 6y - 41 = 0$ intersects the circle $x^2 + y^2 - 4x - 2y + 1 = 0$ at two C and D. The value of 'a' for which the points A, B, C and D are concyclic -

A. 1

B. 3

C. 4

D. 2

Answer: 4

Watch Video Solution

38. The line $x+2y=a$ intersects the circle $x^2+y^2=4$ at two distinct points A and B Another line $12x-6y-41=0$ intersects the circle $x^2+y^2-4x-2y+1=0$ at two C and D. The value of 'a' for which the points A, B, C and D are concyclic -

A. $5x^2+5y^2-8x-16y-36=0$

B. $5x^2+5y^2+8x-16y-36=0$

C. $5x^2+5y^2+8x+16y-36=0$

D. $5x^2+5y^2-8x-16y+36=0$

Answer: 1

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39. Let A,B, and C be three sets such that

$$A=\left\{(x,y) \mid \frac{x}{\cos\theta}=\frac{y}{\sin\theta}=5, \text{where}'\theta'\text{is parameter}\right\}$$
$$B=\left\{(x,y) \mid \frac{x-3}{\cos\phi}=\frac{y-4}{\sin\phi}=r\right\}$$

$$C = \left\{(x, y) \mid (x-3)^2 + (y-4)^2 \leq R^2\right\}$$

If $A \cap C = A$, then minimum value of R is

A. 5

B. 6

C. 10

D. 11

Answer: 3

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40. Let A,B, and C be three sets such that

$$A = \left\{(x, y) \mid \frac{x}{\cos\theta} = \frac{y}{\sin\theta} = 5, \text{where}'\theta'\text{is parameter}\right\}$$

$$B = \left\{(x, y) \mid \frac{x-3}{\cos\phi} = \frac{y-4}{\sin\phi} = r\right\}$$

$$C = \left\{(x, y) \mid (x-3)^2 + (y-4)^2 \leq R^2\right\}$$

If ϕ is fixed and r varies and $(A \cap B) = 1$, then $\sec\phi$ is equal to

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

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

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

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

Answer: 2

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41. Consider the family of circles $x^2 + y^2 - 2x - 2ay - 8 = 0$ passing through two fixed points A and B . Also, $S = 0$ is a cricle of this family, the tangent to which at A and B intersect on the line $x + 2y + 5 = 0$. The distance between the points A and B , is

A. 4

B. $4\sqrt{2}$

C. 6

D. 8

Answer: 3

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42. Show that equation $x^2 + y^2 - 2ay - 8 = 0$ represents, for different values of 'a, asystem of circles"passing through two fixed points A, B on the X-axis, and find the equation ofthat circle of the system the tangents to which at AB meet on the line $x + 2y + 5 = 0$.

A. 3

B. 6

C. $2\sqrt{3}$

D. $3\sqrt{2}$

Answer: 4

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43. Consider the family of circles $x^2+y^2-2x-6y-8=0$ passing through two fixed points A and B . Also, $S=0$ is a cricle of this family, the tangent to which at A and B intersect on the line $x+2y+5=0.$

If the circle $x^2+y^2-10x+2y+c=0$ is orthogonal to $S=0$, then the value of c is

A. 8

B. 9

C. 10

D. 12

Answer: 4

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44. A circle C of radius 1 is inscribed in an equilateral triangle PQR. The points of contact of C with the sides PQ, QR, RP are D, E, F, respectively. The line PQ is given by the equation $\sqrt{3}x+y-6=0$ and the point D is

(3 `sqrt3/2, 3/2). Further, it is given that the origin and the centre of C are on the same side of the line PQ. The equation of circle C is

A. a) $\left(x-2\sqrt{3}\right)^2+(y-1)^2=1$

B. b) $\left(x-2\sqrt{3}\right)^2+\left(y+\frac{1}{2}\right)^2=1$

C. c) $\left(x-\sqrt{3}\right)^2+(y+1)^2=1$

D. d) $\left(x-\sqrt{3}\right)^2+(y-1)^2=1$

Answer: 4

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45. A circle C of radius 1 is inscribed in an equilateral triangle PQR. The points of contact of C with the sides PQ, QR, RP are D, E, F, respectively. The line PQ is given by the equation $\sqrt{3}x+y-6=0$ and the point D is (3 sqrt3/2, 3/2). Further, it is given that the origin and the centre of C are on the same side of the line PQ.Points E and F are given by

A. a) $\left(\frac{\sqrt{3}}{2},\frac{3}{2}\right),\left(\sqrt{3},0\right)$

B. b) $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right), (\sqrt{3}, 0)$

C. c) $\left(\frac{\sqrt{3}}{2}, \frac{3}{2}\right), \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

D. d) $\left(\frac{3}{2}, \frac{\sqrt{3}}{2}\right), \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

Answer: 1

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46. A circle C of radius 1 is inscribed in an equilateral triangle PQR. The points of contact of C with the sides PQ, QR, RP are D, E, F, respectively. The line PQ is given by the equation $\sqrt{3}x + y - 6 = 0$ and the point D is (3 sqrt3/2, 3/2). Further, it is given that the origin and the centre of C are on the same side of the line PQ. Equation of the sides QR, RP are

A. a) $y = \frac{2}{\sqrt{3}}x + 1, y = -\frac{2}{\sqrt{2}}x - 1$

B. b) $y = \frac{1}{\sqrt{3}}x, y = 0$

C. c) $y = \frac{\sqrt{3}}{2}x + 1, y = -\frac{\sqrt{3}}{2}x - 1$

D. d) $y = \sqrt{3}x, y = 0$

Answer: 4

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MATRIX MATCH TYPE

1. Find the derivative of $y = \ln(\cos x^2)$.

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2. Let $x^2 + y^2 + 2gx + 2fy + c = 0$ be an equation of circle. Match the following lists :

List I	List II
a. If the circle lies in the first quadrant, then	**p.** $g < 0$
b. If the circle lies above the x-axis, then	**q.** $g > 0$
c. If the circle lies on the left of the y-axis, then	**r.** $g^2 - c < 0$
d. If the circle touches the positive x-axis and does not intersect the y-axis, then	**s.** $c > 0$

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3. Match the following lists.

List I	List II
a. If $ax + by - 5 = 0$ is the equation of the chord of the circle $(x-3)^2 + (y-4)^2 = 4$, which passes through (2, 3) and at the greatest distance from the center of the circle, then $\|a+b\|$ is equal to	**p.** 6
b. Let O be the origin and P be a variable point on the circle $x^2 + y^2 + 2x + 2y = 0$. If the locus of midpoint of OP is $x^2 + y^2 + 2gx + 2fy + c = 0$, then $(g + f)$ is equal to	**q.** 3
c. The x-coordinates of the center of the smallest circle which cuts the circles $x^2 + y^2 - 2x - 4y - 4 = 0$ and $x^2 + y^2 - 10x + 12y + 52 = 0$ orthogonally is	**r.** 2
d. If θ be the angle between two tangents which are drawn to the circles $x^2 + y^2 - 6\sqrt{3}x - 6y + 27 = 0$ from the origin. Then $2\sqrt{3}\tan\theta$ equals	**s.** 1

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4. Find the derivative of $y = \ln(2x^3 - x)^2$

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5. Find the derivative of $y = x \ln^3 x$.

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6. Match the conics in List I with the statements / expressions in List II.

List I	List II
a. Circle	**p.** The locus of the point (h, k) for which the line $hx + ky = 1$ touches the circle $x^2 + y^2 = 4$
b. Parabola	**q.** Points z in the complex plane satisfying $\|z+2\| - \|z-2\| = \pm 3$
c. Ellipse	**r.** Points of the conic have parametric representation $x = \sqrt{3}\left(\frac{1-t^2}{1+t^2}\right)$, $y = \frac{2t}{1+t^2}$
d. Hyperbola	**s.** The eccentricity of the conic lies in the interval $1 \le x < \infty$
	t. Points z in the complex plane satisfying $\operatorname{Re}(z+1)^2 = \|z\|^2 + 1$

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Exercise (Matrix)

1. Let C_1 and C_2 be two circles whose equations are $x^2 + y^2 - 2x = 0$ and $x^2 + y^2 + 2x = 0$ and $P(\lambda, \lambda)$ is a variable point

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Exercise (Numerical)

1. 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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2. Consider the family of circles $x^2 + y^2 - 2x - 2\lambda - 8 = 0$ passing through two fixed points $A and B$. Then the distance between the points $A and B$ is____

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3. 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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4. If real numbers $x and y$ satisfy $(x + 5)^2 + (y - 12)^2 = (14)^2$, then the minimum value of $\sqrt{x^2 + y^2}$ is_______

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

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6. 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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7. 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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8. Two circle are externally tangent. Lines PAB and $PA'B'$ are common tangents with $A and A'$ on the smaller circle and $B' and B'$ the on the larger circle. If $PA = AB = 4$, then the square of the radius of the circle is________

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9. The length of 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

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10. 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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11. As shown in the figure, three circles which have the same radius r,have centres at $(0, 0); (1, 1) \text{ and } (2, 1)$. If they have a common tangentline, as shown then, their radius 'r' is -

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

View Text Solution

13. 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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14. 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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15. 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

View Text Solution

16. Two circles $C_1 and C_2$ both pass through the points $A(1, 2) and E(2, 1)$ and touch the line $4x - 2y = 9$ at $B and D$, respectively. The possible coordinates of a point C, such that the quadrilateral $ABCD$ is a parallelogram, are (a, b). Then the value of $|ab|$ is________

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17. 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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18. The length of 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

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JEE Main Previous Year

1. If P and Q are the points of intersection of the circles $x^2 + y^2 + 3x + 7y + 2p = 0$ and $x^2 + y^2 + 2x + 2y - p^2 = 0$ then there is a circle passing through P,Q and (1,1) for

A. all values of p

B. all except one value of p

C. all except two values of p

D. exactly one value of p

Answer: 2

View Text Solution

2. Three distinct points A, B and C are given in the 2â€“dimensional coordinate plane such that the ratio of the distance of any one of them from the point (1, 0) to the distance from the point (â€“1, 0) is equal to $\frac{1}{3}$ .Then the circumcentre of the triangle ABC is at the point :

A. $(0, 0)$

B. $\left(\frac{5}{4}, 0\right)$

C. $\left(\frac{5}{2}, 0\right)$

D. $\left(\frac{5}{3}, 0\right)$

Answer: 2

View Text Solution

3. If the circle $x^2 + y^2 - 4x - 8y - 5 = 0$ intersects the line $3x - 4y = m$ at two distinct points, then find the values of m.

A. $35 < m < 85$

B. $-85 < m < -35$

C. $-35 < m < 15$

D. $15 < m < 65$

Answer: C

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4. The two circles $x^2 + y^2 = ax$ and $x^2 + y^2 = c^2 (c > 0)$ touch each other if (1) $a = 2c$ (2) $|a| = 2c$ (3) $2|a| = c$ (4) $|a| = c$

A. $|a| = 2c$

B. $2|a| = c$

C. $|a| = c$

D. $a = 2c$

Answer: 3

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

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

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

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

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

Answer: A

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6. The circle passing through the point (1,-2) and touching the x-axis at (3,0) also passes through the point:

A. $(-5, 2)$

B. $(2, -5)$

C. $(5, -2)$

D. $(-2, 5)$

Answer: C

View Text Solution

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

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

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

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

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

Answer: 4

View Text Solution

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

A. 1

B. 2

C. 3

D. 4

Answer: 3

View Text Solution

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

A. an ellipse which is not a circle

B. a hyperbola

C. a parabola

D. a circle

Answer: 3

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

A. $5\sqrt{3}$

B. 5

C. 10

D. $5\sqrt{2}$

Answer: 1

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JEE Advanced (Single Correct Answer Type)

1. Tangents drawn from the point $P(1, 8)$ to the circle $x^2 + y^2 - 6x - 4y - 11 = 0$ touch the circle at the points A&B ifR is the radius of circum circle of triangle PAB then [R]-

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

A. $(-3/2, 0)$

B. $(-5/2, 2)$

C. $(-3/2, 5/2)$

D. $(-4, 0)$

Answer: D

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3. The locus of the middle 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. $20(x^2 + y^2) - 36 + 45y = 0$

B. $20(x^2 + y^2) + 36 - 45y = 0$

C. $36(x^2 + y^2) - 20x + 45y = 0$

D. $36(x^2 + y^2) + 20x - 45y = 0$

Answer: A

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4. Circle(s) touching x-axis at a distance 3 from the origin and having an intercept of length $2\sqrt{7}$ on y-axis is (are)

A. $x^2 + y^2 - 6x + 8y + 9 = 0$

B. $x^2 + y^2 - 6x + 7y + 9 = 0$

C. $x^2 + y^2 - 6x - 8y + 9 = 0$

D. $x^2 = y^2 - 6x - 7y + 9 = 0$

Answer: 1,3

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5. A circle S passes through the point (0, 1) and is orthogonal to the circles $(x - 1)^2 + y^2 = 16$ and $x^2 + y^2 = 1$. Then (A) radius of S is 8 (B) radius of S is 7 (C) center of S is (-7,1) (D) center of S is (-8,1)

A. radius of S is 8

B. radius of S is 7

C. centre of S is $(-7, 1)$

D. centre of S is $(-8, 1)$

Answer: 2,3

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6. Let RS be the diameter of the circle $x^2 + y^2 = 1,$ where S is the point $(1, 0)$ Let P be a variable apoint (other than R and S) on the circle and tangents to the circle at S and P meet at the point Q.The normal to the circle at P intersects a line drawn through Q parallel to RS at point E. then the locus of E passes through the point(s)- (A) $\left(\frac{1}{3}, \frac{1}{\sqrt{3}}\right)$ (B) $\left(\frac{1}{4}, \frac{1}{2}\right)$ (C) $\left(\frac{1}{3}, -\frac{1}{\sqrt{3}}\right)$ (D) $\left(\frac{1}{4}, -\frac{1}{2}\right)$

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

B. $\left(\frac{1}{4}, \frac{1}{2}\right)$

C. $\left(\frac{1}{3}, -\frac{1}{\sqrt{3}}\right)$

D. $\left(\frac{1}{4}, -\frac{1}{2}\right)$

Answer: 1,3

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7. Let T be the line passing through the points $P(-2, 7)$ and $Q(2, -5)$. Let F_1 be the set of all pairs of circles (S_1, S_2) such that T is tangent to S_1 at P and tangent to S_2 at Q, and also such that S_1 and S_2 touch each other at a point, say, M. Let E_1 be the set representing the locus of M as the pair (S_1, S_2) varies in F_1. Let the set of all straight lines segments joining a pair of distinct points of E_1 and passing through the point $R(1, 1)$ be F_2. Let E_2 be the set of the mid-points of the line segments in the set F_2. Then, which of the following statement(s) is (are) TRUE? The point $(-2, 7)$ lies in E_1 (b) The point $\left(\frac{4}{5}, \frac{7}{5}\right)$ does NOT lie in E_2 (c) The point $\left(\frac{1}{2}, 1\right)$ lies in E_2 (d) The point $\left(0, \frac{3}{2}\right)$ does NOT lie in E_1

A. The point $(-2, 7)$ lies in E_1

B. The point $(4/5, 7/5)$ does NOT lie in E_2

C. The point $(1/2, 1)$ lie in E_2

D. The point $(0, 3/2)$ does NOT lie in E_1

Answer: 2,4

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8. A possible equation of L is (A) x 3y 1 (B) x 3y 1 (C) x 3y 1 (D) x 3y 5

A. $x - \sqrt{3}y = 1$

B. $x + \sqrt{3}y = 1$

C. $x - \sqrt{3}y = -1$

D. $x + \sqrt{3}y = 5$

Answer: 1

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9. A tangent PT is drawn to the circle $x^2 + y^2 = 4$ at the point $P(\sqrt{3}, 1)$. A straight line L, perpendicular to PT is a tangent to the circle $(x - 3)^2 + y^2 = 1$ then find a common tangent of the two circles

A. $x = 4$

B. $y = 2$

C. $x + \sqrt{3}y = 4$

D. $x + 2\sqrt{2}y = 6$

Answer: D

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10. PARAGRAPH X Let S be the circle in the xy -plane defined by the equation $x^2 + y^2 = 4.$ (For Ques. No 15 and 16) Let E_1E_2 and F_1F_2 be the chords of S passing through the point $P_0(1, 1)$ and parallel to the x-axis and the y-axis, respectively. Let G_1G_2 be the chord of S passing through P_0 and having slope -1 . Let the tangents to S at E_1 and E_2

meet at E_3 , the tangents to S at F_1 and F_2 meet at F_3 , and the tangents to S at G_1 and G_2 meet at G_3 . Then, the points E_3, F_3 and G_3 lie on the curve $x+y=4$ (b) $(x-4)^2+(y-4)^2=16$ (c) $(x-4)(y-4)=4$ (d) $xy=4$

A. $x+y=4$

B. $(x-4)^2+(y-4)^2=16$

C. $(x-4)(y-4)=4$

D. $xy=4$

Answer: A

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11. Let S be the circle in the xy -plane defined by the equation $x^2+y^2=4$. (For Ques. No 15 and 16) Let P be a point on the circle S with both coordinates being positive. Let the tangent to S at P intersect the coordinate axes at the points M and N . Then, the mid-point of the line segment MN must lie on the curve (a)$(x+y)^2 = 3xy$ (b) $x^{2/3} + y^{2/3} = 2^{4/3}$ (c) $x^2 + y^2 = 2xy$ (d) $x^2 + y^2 = x^2y^2$

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

B. $x^{2/3} + y^{2/3} = 2^{4/3}$

C. $x^2 + y^2 = 2xy$

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

Answer: 4

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12. The centres of two circles C_1 and C_2 each of unit radius are at a distance of 6 unit from each other. Let P be the mid-point of the line segment joining the centres of C_1 and C_2 and C be a circle touching circles C_1 and C_2 externally. If a common tangent to C_1 and C passing through P is also a common tangent to C_2 and C, then the radius of the circle C, is

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13. 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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14. For how many values of p, the circle $x^2 + y^2 + 2x + 4y - p = 0$ and the coordinate axes have exactly three common points?

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Question Bank

1. If $ax + by = 10$ is the chord of minimum length of the circle $(x - 10)^2 + (y - 20)^2 = 729$ and the chord passes through $(5, 15)$ then the value of $(4a + 2b)$ is

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2. Locus of the poirit of intersection of the pair of perpendicular tangents to the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 7$ is the director circle of the circle with radius equal to

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3. Let AB and CD are two parallel chords of circle whose radius is 5 units. If P and Q are mid points of AB and CD respectively such that $PA.\ PB = 9, QC.\ QD = 16$, then distance betweẹn AB and CD is

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

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7. The radius of the circle whose two normals are represented by the equation $x^2 - 5xy - 5x + 25y = 0$ and which touches externally the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ is equal to

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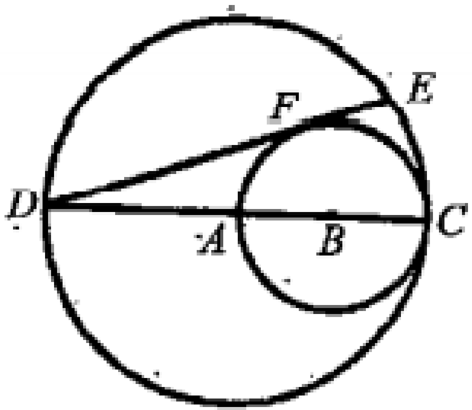
8. If the diagram, DC is a diameter of the large circle centered at A, and AC is a diameter of the smaller circle centered at B. If DE is tangent to the smaller circle at F and $DC = 12$ then the length of DE is



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9. If $2x - 3y = 0$ is the equation of the common chord of the circles, $x^2 + y^2 + 4x = 0$ and $x^2 + y^2 + 2\lambda y = 0$, then the value of λ is

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

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11. 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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12. In the figure given, two circles with centres C_t and C_2 are 35 units apart, i.e. $C_1C_2 = 35$. The radii of the circles with centres C_1 and C_2 are 12 and 9 respectively. If P is the intersection of C_1C_2 and a common internal tangent to the circles, then $l(C_1P)$ equals

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13. 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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14. The maximum distance of the point (4,4) from the circle $x^2 + y^2 - 2x - 15 = 0$ is

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15. If the circle $(x - a)^2 + y^2 = 25$ intersects the circle $x^2 + (y - b)^2 = 16$ in such a way that common chord is of maximum length, then value of $a^2 + b^2$ is

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16. If a circle $S(x, y) = 0$ touches at the point $(2, 3)$ of the line $x + y = 5$ and $S(1, 2) = 0$, then $(\sqrt{2} \times \text{ Radius})$` of such circle is

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