MATHS

BOOKS - OBJECTIVE RD SHARMA MATHS VOL I (HINGLISH)

CIRCLES

Illustration

1. Find the equation of a circle whose centre is (2,-3) and radius 5.

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

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

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

D. none of these

Answer: B

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

A. 10

B. $2\sqrt{5}$

C. 6

D. 4

Answer: B

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

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

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

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

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

Answer: C

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4. The lines $2x - 3y - 5 = 0$ and $3x - 4y = 7$ are diameters of a circle of area $154(= 49\pi)$ sq. units, then the equation of the circle is

A. $x^2 + y^2 + 2x - 2y - 62 = 0$

B. $x^2 + y^2 + 2x - 2y - 47 = 0$

C. $x^2 + y^2 - 2x + 2y - 47 = 0$

D. $x^2 + y^2 - 2x + 2y - 62 = 0$

Answer: C

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5. If the lines $2x + 3y + 1 = 0$ and $3x - y - 4 = 0$ lie along diameters of a circle of circumference 10π, then the equation of the circle is

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

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

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

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

Answer: D

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6. If a circle has two of its diameters along the lines $x + y = 5$ and $x - y = 1$ and has area 9π, then the equation of the circle is

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

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

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

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

Answer: A

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7. The equation of the circle passing through (4, 5) having the centre (2, 2), is

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

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

C. $x^2 + y^2 - 4x = 13$

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

Answer: B

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

A. (4, 7)

B. (7, 4)

C. (9, 4)

D. (4, 9)

Answer: A

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9. If the centroid of an equilateral triangle is (2, -2) and its one vertex is (-1, 1) , then the equation of its circumcircle is

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

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

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

D. $x^2 + y^2 + 4x + 4y + 10 = 0$

Answer: A

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10. I If a point (α, β) lies on the circle $x^2 + y^2 = 1$ then the locus of the point $(3\alpha. + 2, \beta)$, is

A. a straight line

B. an ellipse

C. a parabola

D. none of these

Answer: B

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11. The equations of the circle which touches the axis of y at the origin and passes through (3, 4) , is

A. $2\left(x^2+y^2\right)-3x=0$

B. $3\left(x^2+y^2\right)-25x=0$

C. $4\left(x^2+y^2\right)-25x=0$

D. $4\left(x^2+y^2\right)-25x+10=0$

Answer: B

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12. The equation of the circle of radius 5 and touching the coordinates axes in third quadrant, is

A. $(x - 5)^2 + (y + 5)^2 = 25$

B. $(x + 4)^2 + (y + 4)^2 = 25$

C. $(x + 6)^2 + (y + 6)^2 = 25$

D. $(x + 5)^2 + (y + 5)^2 = 25$

Answer: D

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13. A circle of radius 2 units touches the co ordinate axes in the first quadrant. If the circle makes a complete rotation on the x-axis along the positive direction of the x-axis, then the equation of the circle in the new position is

A. $x^2 + y^2 - 4(x + y) - 8\pi x + (4\pi + 1)^2 = 0$

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

C. $x^2 + y^2 - 8\pi x - 4y + (4\pi + 2)^2 = 0$

D. none of these

Answer: A

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

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

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

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

D. none of these

Answer: C

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15. The equations of the circles which touch both the axes and the line x = a are

A. $x^2 + y^2 \pm ax \pm ay + \frac{a^2}{4} = 0$

B. $x^2 + y^2 + ax \pm ay + \frac{a^2}{4} = 0$

C. $x^2 + y^2 - ax \pm ay + \frac{a^2}{4} = 0$

D. none of these

Answer: C

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16. A circle of radius 6 units touches the coordinates axes in the first quadrant. Find the equation of its image in the line mirror $y = 0$.

A. $x^2 + y^2 - 12x + 12y + 36 = 0$

B. $x^2 + y^2 - 12x - 12y + 36 = 0$

C. $x^2 + y^2 + 12x - 12y + 36 = 0$

D. $x^2 + y^2 + 12x + 12y + 36 = 0$

Answer: A

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17. The locus of the centre of the circles which touches both the axes is given by

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

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

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

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

Answer: A

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

A. $x^2 + y^2 - 8x - 16y + 64 = 0$

B. $x^2 + y^2 - 8x + 16y + 64 = 0$

C. $x^2 + y^2 + 8x + 16y + 64 = 0$

D. $x^2 + y^2 + 8x - 16y + 64 = 0$

Answer: A

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19. 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. $(x + 16)^2 + (y + 2)^2 = 5^2$

B. $(x - 16)^2 + (y - 2)^2 = 5^2$

C. $(x + 16)^2 + (y - 2)^2 = 5^2$

D. $(x + 16)^2 + (y + 2)^2 = 5^2$

Answer: A

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20. If an equilateral triangle is inscribed in the circle $x^2 + y^2 = a^2$, the length of its each side is

A. $\sqrt{2}a$

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

C. $\sqrt{3}a$

D. none of these

Answer: C

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21. If $g^2 + f^2 = c$, then the equation $x^2 + y^2 + 2gx + 2fy + c = 0$ will represent

A. a circle of radius g

B. a circle of radius f

C. a circle of diameter $\sqrt{c}$

D. a circle of radius 0

Answer: D

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22. The equation

$\lambda^2 x^2 + \left(\lambda^2 - 5\lambda + 4\right)xy + (3\lambda - 2)y^2 - 8x + 12y - 4 = 0$ will represent a circle, if $\lambda =$

A. 1

B. 4

C. 2

D. none of these

Answer: A

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23. The coordinates of the centre and radius of the circle represented by the equation

$(3 - 2\lambda)x^2 + \lambda y^2 - 4x + 2y - 4 = 0$ are

A. (2, 1), 3

B. (-2, 1), 3

C. (2, 1), 3

D. (2, -1), 1

Answer: C

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24. If $3x^2 + 2\lambda xy + 3y^2 + (6 - \lambda)x + (2\lambda - 6)y - 21 = 0$ is the equation of a circle, then its radius is

A. 1

B. 3

C. $2\sqrt{2}$

D. none of these

Answer: B

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25. If the area of the circle $4x^2 + 4y^2 - 8x + 16y + k = 0$ is 9π square units, then the value of k is

A. 4

B. 16

C. -16

D. none of these

Answer: C

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

A. (-3, -4)

B. (3, 4)

C. (3, -4)

D. (-3, 4)

Answer: A

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27. The straight line $\frac{x}{a}+\frac{y}{b}=1$ cuts the coordinate axes at A and B . Find the equation of the circle passing through `O(0,0), A and B .

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

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

C. $x^2 + y^2 + ax + by = 0$

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

Answer: A

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28. If the points $(0, 0), (1, 0), (0, 1)$ and (t, t) are concyclic, then t is equal to

A. -1

B. 1

C. 2

D. -2

Answer: B

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29. Find the equation of the circle passing through $(1, 0)$ and $(0, 1)$ and having the smallest possible radius.

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

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

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

D. none of these

Answer: B

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30. The $(x - x_1)(x - x_2) + (y - y_1)(y - y_2 = 0$ represents a circle whose centre is

A. $\left(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2}\right)$

B. $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

C. (x_1, y_2)

D. (x_2, y_2)

Answer: B

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31. The circle described on the line joining the points $(0, 1), (a, b)$ as diameter cuts the x-axis in points whose abscissae are roots of the equation

A. $x^2 + ax + b = 0$

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

C. $x^2 + ax - b = 0$

D. $x^2 - ax - b = 0$

Answer: B

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32. If the abscissa and ordinates of two points P and Q 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.

A. $x^2 + y^2 + 2ax + 2py - b^2 - q^2 = 0$

B. $x^2 + y^2 - 2ax - 2py + b^2 + q^2 = 0$

C. $x^2 + y^2 - 2ax - 2py - b^2 - q^2 = 0$

D. $x^2 + y^2 + 2ax + 2py + b^2 + q^2 = 0$

Answer: A

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33. 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.

A. $x + y = 1$

B. $2(x - y) = 5$

C. $2x + 2y = 5$

D. none of these

Answer: C

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34. Two rods of lengths a and b slide along the x-axis and y-axis respectively in such a manner that their ends are concyclic. The locus of the centre of the circle passing through the end points is:

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

B. $4\left(x^2 - y^2\right) = a^2 - b^2$

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

D. $x^2 - y^2 = 4\left(a^2 - b^2\right)$

Answer: B

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35. A circle touches a given straight line and cuts off a constant length 2d from another straight line perpendicular to the first straight line. The locus of the centre of the circle, is

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

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

C. $xy = d^2$

D. none of these

Answer: A

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36. 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. $x^2 + y^2 - 6x \pm 8y + 9 = 0$

B. $x^2 + y^2 - 6x \pm 7y + 9 = 0$

C. $x^2 + y^2 + 6x \pm 8y + 9 = 0$

D. $x^2 + y^2 - 8x \pm 6y + 9 = 0$

Answer: A

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37. If the points $(\lambda, -\lambda)$ lies inside the circle $x^2 + y^2 - 4x + 2y - 8 = 0$, then find the range of λ.

A. (-1, 4)

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

C. $(4, \infty)$

D. [-1, 4]

Answer: A

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38. The set of values of 'a' for which the point (a-1, a+1) lies outside the circle $x^2+y^2=8$ and inside the circle $x^2+y^2-12x+12y-62=0$, is

A. $\left(-\infty, -\sqrt{3}\right) \cup \left(\sqrt{3}, \infty\right)$

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

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

D. none of these

Answer: C

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39. If (2, 4) is a point interior to the circle $x^2 + y^2 - 6x - 10y + \lambda = 0$ and the circle does not cut the axes at any point, then

A. $\lambda \in (25, 32)$

B. $\lambda \in (9, 32)$

C. $\lambda \in (32, \infty)$

D. none of these

Answer: A

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40. The set of values of a for which the point $(2a, a+1)$ is an interior point of the larger segment of the circle $x^2 + y^2 - 2x - 2y - 8 = 0$ made by the chord $x - y + 1 = 0$, is

A. (-1,9/5)

B. (0, 9/5)

C. $(0, \infty)$

D. none of these

Answer: B

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41. 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

A. 2

B. 3

C. 4

D. 5

Answer: A

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42. α, β and γ are parametric angles of three points P, Q and R respectively, on the circle $x^2 + y^2 = 1$ and A is the point (-1, 0). If the lengths of the chords AP, AQ and AR are in GP, then $\frac{\cos\alpha}{2}, \frac{\cos\beta}{2}$ and $\frac{\cos\gamma}{2}$ are in

A. AP

B. GP

C. HP

D. none of these

Answer: B

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43. The centre of the circle $x = 2 + 3\cos\theta, y = 3\sin\theta - 1$, is

A. (3, 3)

B. (2, -1)

C. (-2, 1)

D. (-1, 2)

Answer: B

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

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

B. $\alpha^2 + \beta^2 - a^2$

C. a^2

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

Answer: C

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45. If the line $y = mx - (m - 1)$ cuts the circle $x^2 + y^2 = 4$ at two real and distinct points then

A. $m \in (1, 2)$

B. $m = 1$

C. $m = 2$

D. $m \in R$

Answer: D

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46. If the line $y = mx$ does not intersect the circle $(x + 10)^2 + (y + 10)^2 = 180$, then

A. $m \in (-2, \infty)$

B. $m \in (-\infty, -1/2)$

C. $m \in (-2, -1/2)$

D. none of these

Answer: C

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47. 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.

A. $\left(-\infty, -\sqrt{3}\right] \cup \left[\sqrt{3}, \infty\right)$

B. $\left[-\sqrt{3}, \sqrt{3}\right]$

C. $\left[\sqrt{3}, \infty\right)$

D. none of these

Answer: A

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

A. $15 < m < 65$

B. $35 < m < 85$

C. $-85 < m < -35$

D. $-35 < m < 15$

Answer: D

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49. The line $3x - 2y = k$ meets the circle $x^2 + y^2 = 4r^2$ at only one point, if $k^2 =$

A. $20r^2$

B. $52r^2$

C. $\frac{52}{9}r^2$

D. $\frac{20}{9}r^2$

Answer: B

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50. If $\frac{x}{\alpha} + \frac{y}{\beta} = 1$ touches the circle $x^2 + y^2 = a^2$ then point $\left(\frac{1}{\alpha}, \frac{1}{\beta}\right)$ lies on (a) straight line (b) circle (c) parabola (d) ellipse

A. a straight line

B. a circle

C. a parabola

D. an ellipse

Answer: B

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51. The locus of the point $P(h, k)$ for which the line $hx + ky = 1$ touches the circle $x^2 + y^2 = 4$, is

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: A

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52. If the line $y\cos\alpha = x\sin\alpha + a\cos\alpha$ be a tangent to the circle $x^2 + y^2 = a^2$, then

A. $\sin^2\alpha = 1$

B. $\cos^2\alpha = 1$

C. $\sin^2\alpha = a^2$

D. $\cos^2\alpha = a^2$

Answer: B

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53. Let L_1 be a straight line passing through the origin and L_2 be the straight line $x + y = 1$ if the intercepts made by the circle $x^2 + y^2 - x + 3y = 0$ on L_1 and L_2 are equal, then which of the following equations can represent L_1?

A. $x + y = 0, x - 7y = 0$

B. $x - y = 0, x + 7y = 0$

C. $7x + y = 0$

D. $x - 7y = 0$

Answer: B

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54. If the line $lx + my - 1 = 0$ touches the circle $x^2 + y^2 = a^2$, then prove that (l, m) lies on a circle.

A. $x^2 + y^2 = a^{-2}$

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

C. $x^2 + y^2 = a^{-1}$

D. none of these

Answer: A

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55. 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. $l \in (-8, 8)$

B. $l \in \left(-4\sqrt{2}, 4\sqrt{2}\right)$

C. $l \in (0.8)$

D. $l \in (-8, 0)$

Answer: A

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

A. $2x + 3y = 13$

B. $3x - y = 3$

C. $-2y + 4 = 0$

D. $x - y + 1 = 0$

Answer: C

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

A. $\sqrt{3}$

B. $\sqrt{2}$

C. 3

D. 2

Answer: C

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58. 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. $2k$ (b) $\frac{k}{2}$ (c) k (d) none of these

A. 2k

B. k/2

C. k

D. none of these

Answer: C

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59. Find the equation of the tangent to the circle $x^2 + y^2 - 30x + 6y + 109 = 0$ at $(4, -1)$

A. $11x - 2y - 46 = 0$

B. $11x - 3y - 47 = 0$

C. $10x - 3y - 43 = 0$

D. $11x + 2y - 42 = 0$

Answer: A

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60. The equation of the tangent of the circle $x^2 + y^2 + 4x - 4y + 4 = 0$ which make equal intercepts on the positive coordinate axes, is-

A. $x+y=2$

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

C. $x+y=4$

D. $x+y=8$

Answer: B

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61. If the tangent from a point p to the circle $x^2+y^2=1$ is perpendicular to the tangent from p to the circle $x^2+y^2=3$, then the locus of p is

A. a circle of radius 2

B. a circle of radius 4

C. a circle of radius 3

D. none of these

Answer: A

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62. The locus of the point of intersection of perpendicular tangents to the circles $x^2 + y^2 = a^2$ and $x^2 + y^2 = b^2$, is

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

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

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

D. none of these

Answer: B

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

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

B. $3\left(x^2 + y^2\right) = a^2$

C. $3\left(x^2 + y^2\right) = 4a^2$

D. $4\left(x^2 + y^2\right) = 3a^2$

Answer: C

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64. If $5x - 12y + 10 = 0$ and $12y - 5x + 16 = 0$ are two tangents to a circle, then the radius the circle, is

A. 1

B. 2

C. 4

D. 6

Answer: A

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65. 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. $7x + 24y = 230$

Answer: A

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66. If the line hx + ky = 1 touches $x^2 + y^2 = a^2$, then the locus of the point (h, k) is a circle of radius

A. a

B. 1/a

C. $\sqrt{a}$

D. $1/\sqrt{a}$

Answer: B

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67. The area of the triangle formed by the tangent at the point (a, b) to the circle $x^2 + y^2 = r^2$ and the coordinate axes, is

A. $\frac{r^4}{2ab}$

B. $\frac{r^4}{2|ab|}$

C. $\frac{r^4}{ab}$

D. $\frac{r^4}{|ab|}$

Answer: B

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68. Equation of the tangent to the circle at the point (1, -1) whose centre is the point of intersection of the straight lines x-y=1 and 2x+y-3=0, is

A. 3x-y-4=0

B. x+4y+3=0

C. x-3y-4=0

D. 4x+y-3=0

Answer: B

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69. If the line $2x - y + 1 = 0$ touches the circle at the point $(2, 5)$ and the centre of the circle lies in the line $x + y - 9 = 0$. Find the equation of the circle.

A. $x^2 + y^2 - 12x + 6y + 5 = 0$

B. $x^2 + y^2 - 12x - 6y - 5 = 0$

C. $x^2 + y^2 + 12x + 6y + 15 = 0$

D. $x^2 + y^2 - 12x - 6y + 25 = 0$

Answer: D

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70. If the line $4x - 3y = -12$ is tangent at point $(-3, 0)$ and the line $3x + 4y = 16$ is tangent at the point $(4, 1)$ to a circle then equation of circle

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

B. $x^2 + y^2 - 2x + 6y - 20 = 0$

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

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

Answer: A

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71. The equation of the circle which touches the circle $x^2 + y^2 - 6x + 6y + 17 = 0$ externally and to which the lines $x^2 - 3xy - 3x + 9y = 0$ are normals, is

A. $x^2 + y^2 - 6x - 2y - 1 = 0$

B. $x^2 + y^2 - 6x - 2y + 1 = 0$

C. $x^2 + y^2 + 6x + 2y + 1 = 0$

D. $x^2 + y^2 - 6x + 2y + 1 = 0$

Answer: B

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

A. $2\sqrt{3}$

B. $3\sqrt{2}$

C. $\sqrt{6}$

D. none of these

Answer: A

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73. Find the equation of the tangents through (7,1) to the circle $x^2 + y^2 = 25$

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

B. $4x + 3y - 31 = 0, 3x - 4y - 17 = 0$

C. $3x - 2y - 19 = 0, 2x + 3y - 17 = 0$

D. none of these

Answer: A

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

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

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

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

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

Answer: C

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75. Angle at which the circle $x^2 + y^2 = 16$ can be seen from $(8, 0)$ is

A. 30°

B. 60°

C. 150°

D. 120°

Answer: B

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76. The angle between a pair of tangents from a point P to the circe $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is 2α. Find the equation of the locus of the point P.

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: D

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

A. $h = \pm r$

B. $h = \pm 2r$

C. $h^2 + r^2 = 1$

D. $h = \pm 3r$

Answer: A

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78. The number of real tangents that can be drawn from (2, 2) to the circle $x^2 + y^2 - 6x - 4y + 3 = 0$, is

A. 0

B. 1

C. 2

D. 3

Answer: A

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79. Tangents drawn from the point (4, 3) to the circle $x^2 + y^2 - 2x - 4y = 0$ are inclined at an angle

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$

Answer: D

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

A. $\pi/3$

B. $\pi/6$

C. $\pi/2$

D. $\pi/8$

Answer: C

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81. The length of the tangent to the circle $x^2 + y^2 - 2x - y - 7 = 0$ from (-1, -3), is

A. $\sqrt{8}$

B. $2\sqrt{2}$

C. 4

D. 8

Answer: B

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82. The length of the tangent from (0, 0) to the circle $2\left(x^2+y^2\right)+x-y+5=0$, is

A. $\sqrt{5}$

B. $\sqrt{5}/2$

C. $\sqrt{2}$

D. $\sqrt{5/2}$

Answer: D

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83. 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 $x^2 + y^2 + 2gx + 2fy + c_2 = 0$

A. $c_1 - c$

B. $c - c_1$

C. $\sqrt{c - c_1}$

D. $\sqrt{c_1 - c}$

Answer: D

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

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

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

A. $1:2$

B. $2:3$

C. $3:4$

D. none of these

Answer: A

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

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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86. The locus of a point which moves such that the tangents from it to the two circles $x^2 + y^2 - 5x - 3 = 0$ and

$3x^2 + 3y^2 + 2x + 4y - 6 = 0$ are equal, is given by

A. $2x^2 + 2y^2 + 7x + 4y - 3 = 0$

B. $17x + 4y + 3 = 0$

C. $4x^2 + 4y^2 - 3x + 4y - 9 = 0$

D. $13x - 4y + 15 = 0$

Answer: B

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

A. $\tan^{-1}\left(\frac{a}{\sqrt{S_1}}\right)$

B. $2\tan^{-1}\left(\frac{a}{\sqrt{S_1}}\right)$

C. $2\tan^{-1}\left(\frac{\sqrt{S_1}}{a}\right)$

D. none of these

Answer: B

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

A. 4

B. $2\sqrt{5}$

C. 5

D. $3\sqrt{5}$

Answer: C

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89. The angle between the tangents drawn from a point on the director circle $x^2 + y^2 = 50$ to the circle $x^2 + y^2 = 25$, is

A. 45°

B. 60°

C. 90°

D. 120°

Answer: C

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90. Tangents are drawn from a point on the circle $x^2 + y^2 - 4x + 6y - 37 = 0$ to the circle $x^2 + y^2 - 4x + 6y - 12 = 0$. The angle between the tangents, is

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

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

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

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

Answer: D

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91. If the chord of contact of the tangents drawn from a point on the circle $x^2 + y^2 + y^2 = a^2$ 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.

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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92. 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 $x^2 + y^2 = 25$.

A. (25, -50)

B. (-25, 50)

C. (-25, -50)

D. (25, 50)

Answer: B

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93. The range of g so that we have always a chord of contact of tangents drawn from a real point (α, α) to the circle $x^2 + y^2 + 2gx + 4y + 2 = 0$, is

A. (-3, 0)

B. (-4, 1)

C. (-4, 0)

D. none of these

Answer: C

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94. Find the condition that the chord of contact of tangents from the point (α, β) to the circle $x^2 + y^2 = a^2$ should subtend a right angle at the centre. Hence find the locus of (α, β).

A. $\alpha^2 + \beta^2 = \frac{a^2}{2}$

B. $\alpha^2 + \beta^2 = a^2$

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

D. none of these

Answer: C

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95. Tangents are drawn from the point (h,k) to ^circle $x^2 + y^2 = a^2$; Prove that the area of the triangle formed by them and the straight line joining their point of contact is $\frac{a\left(h^2 + k^2 - a^2\right)^{\frac{3}{2}}}{h^2 + k^2}$

A. $\frac{\left(h^2 + k^2 - a^2\right)^{3/2}}{h^2 + k^2}$

B. $\frac{a\left(h^2 + k^2 - a^2\right)^{1/2}}{h^2 + k^2}$

C. $\frac{a\left(h^2 + k^2 - a^2\right)^{1/2}}{h^2 + k^2}$

D. $\frac{\left(h^2+k^2-a^2\right)^{3/2}}{a\left(h^2+k^2\right)}$

Answer: B

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96. From the point P(3, 4) tangents PA and PB are drawn to the circle $x^2+y^2+4x+6y-12=0$. The area of Δ PAB in square units, is

A. $\frac{1323}{42}$

B. $\frac{1715}{74}$

C. $\frac{926}{17}$

D. $\frac{1409}{13}$

Answer: B

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97. The equation of the chord of the circle $x^2 + y^2 - 6x + 8y = 0$ which is bisected at the point (5, -3), is

A. 2x+y-7=0

B. x+2y+1=0

C. 2x-y-13=0

D. x-2y-11=0

Answer: A

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98. Find the middle point of the chord intercepted on line $lx + my + n = 0$ by circle $x^2 + y^2 = a^2$.

A. $\left(\frac{-l}{l^2 + m^2}, \frac{-m}{l^2 + m^2}\right)$

B. $\left(\frac{-\ln}{l^2 + m^2}, \frac{-mn}{l^2 + m^2}\right)$

C. $\left(\frac{-l}{n\left(l^2 + m^2\right)}, \frac{-m}{n\left(l^2 + m^2\right)}\right)$

D. none of these

Answer: B

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99. 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 $(c, 0)$

A. $x^2 + y^2 = \frac{a^2}{2}$

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

C. $x^2 + y^2 = \frac{a^2}{4}$

D. none of these

Answer: A

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100. The locus of the middle points of chords of the circle $x^2 + y^2 = 25$ which are parallel to the line $x - 2y + 3 = 0$, is

A. x+2y=0

B. 2x+y=0

C. x-2y=0

D. 2x-y=0

Answer: B

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101. If the line $lx + my + n = 0$ touches the circle $x^2 + y^2 = a^2$, then prove that $\left(l^2 + m^2\right)^2 = n^2$.

A. $\left(\frac{a^2l}{n}, \frac{a^2m}{n}\right)$

B. $\left(a\frac{-a^2l}{n}, \frac{-a^2m}{n}\right)$

C. $\left(\frac{-a^2n}{n}, \frac{-a^2n}{m}\right)$

D. none of these

Answer: B

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102. If the pole of a straight line with respect to the circle $x^2 + y^2 = a^2$ lies on the circle $x^2 + y^2 = 9a^2$, then the straight line touches the circle

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

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

C. $9\left(x^2 + y^2\right) = a^2$

D. $4\left(x^2 + y^2\right) = 9a^2$

Answer: C

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103. The length of the transversal common tangent to the circle $x^2 + y^2 = 1$ and $(x - t)^2 + y^2 = 1$ is $\sqrt{21}$, then t=

A. ± 2

B. ± 5

C. ± 3

D. none of these

Answer: B

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104. Let the line segment joining the centres of the circles $x^2 - 2x + y^2 = 0$ and $x^2 + y^2 + 4x + 8y + 16 = 0$ intersect the circles at P and Q respectively. Then the equation of the circle with PQ as its diameter is

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

B. $5x^2 + 5y^2 - 8x - 24y + 27 = 0$

C. $5x^2 + 5y^2 + 8x + 24y + 27 = 0$

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

Answer: D

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

A. 3

B. 4

C. 1

D. 2

Answer: A

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

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

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

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

Answer: B

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107. Two circles of radii r_1 and $r_2, r_1 > r_2 \geq 2$ touch each other externally. If θ be the angle between the direct common tangents, then,

A. $\theta = \sin^{-1}\left(\frac{r_1 + r_2}{r_1 - r_2}\right)$

B. $\theta = 2\sin^{-1}\left(\frac{r_1 - r_2}{r_1 + r_2}\right)$

C. $\theta = \sin^{-1}\left(\frac{r_1 - r_2}{r_1 + r_2}\right)$

D. none of these

Answer: B

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108. A circle touches the x-axis and also touches the circle with center $(0, 3)$ and radius 2. The locus of the center

A. parabola

B. a hyperbola

C. a circle

D. an ellipse

Answer: A

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109. For the given circles $x^2 + y^2 - 6x - 2y + 1 = 0$ and $x^2 + y^2 + 2x - 8y + 13 = 0$, which of the following is true?

A. One circle lies inside the other

B. One circle lies completely outside the other

C. Two circles intersection in two points

D. They touch each other externally

Answer: D

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110. How many common tangents can be drawn to the following circles $x^2 + y^2 = 6x$ and $x^2 + y^2 + 6x + 2y + 1 = 0$?

A. 4

B. 3

C. 2

D. 1

Answer: A

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111. There are two circles C_1 and C_2 touching each other and the coordinate axes, if C_1 is smaller than C_2 and its radius is 2 units, then radius of C_2, is

A. $6 + 4\sqrt{2}$

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

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

D. none of these

Answer: A

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112. For the two circles $x^2 + y^2 = 16$ and $x^2 + y^2 - 2y = 0$, there is/are

A. one pair of common tangents

B. two pairs of common tangents

C. three common tangents

D. no common tangents

Answer: D

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113. The common tangents to the circles $x^2 + y^2 + 2x = 0$ and $x^2 + y^2 - 6x = 0$ form a triangle which is

A. equilateral

B. isosceles

C. right angled

D. none of these

Answer: B

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114. If two circles $(x - 1)^2 + (y - 3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points , then

A. $2 < r < 8$

B. $r < 2$

C. $r = 2$

D. $r > 2$

Answer: A

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115. 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. c=|a|

B. 2a=|c|

C. 2c=a

D. none of these

Answer: A

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116. The number of common tangents to the circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 6x - 8y = 24$ is

A. 0

B. 1

C. 3

D. 4

Answer: B

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117. The number of common tangents to the circles one of which passes through the origin and cuts off intercepts 2 from each of the axes and the other circle has the segment joining the origin and the point (1, 1) as a diameter, is

A. 0

B. 1

C. 2

D. 3

Answer: B

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118. The length of the common chord of two circles of radii 15 and 20, whose centres are 25 units apart, is

A. 24

B. 25

C. 15

D. 20

Answer: A

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119. If length of the common chord of the circles $x^2 + y^2 + 2x + 3y + 1 = 0$ and $x^2 + y^2 + 4x + 3y + 2 = 0$ then the value of $[a]$. (where [-] denotes greatest integer function)

A. $\frac{9}{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

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

Answer: B

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120. The length of the common chord of the circles $(x - a)^2 + (y - b)^2 = c^2$ and $(x - b)^2 + (y - a)^2 = c^2$, is

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

B. $\sqrt{4c^2 - 2(a - b)^2}$

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

D. $\sqrt{4c^2 + 2(a - b)^2}$

Answer: B

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121. If the circle $x^2 + y^2 + 6x - 2y + k = 0$ bisects the circumference of the circle $x^2 + y^2 + 2x - 6y - 15 = 0$, then

A. 21

B. -21

C. 23

D. -23

Answer: D

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122. If the circles $x^2 + y^2 + 2gx + 2fy + c = 0$ bisects $x^2 + y^2 + 2g'x + 2f'y + c' = 0$ then the length of the common chord of these two circles is -

A. $2\sqrt{g^2 + f^2 - c}$

B. $2\sqrt{g'^2 + g'^2 - c'}$

C. $2\sqrt{g^2 + f^2 + c}$

D. $2\sqrt{g'^2 + f'^2 + c'}$

Answer: B

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123. If the circle $x^2 + y^2 + 4x + 22y + c = 0$ bisects the circumference of the circle $x^2 + y^2 - 2x + 8y - d = 0$,then $(c + d)$is equal to

A. 60

B. 50

C. 40

D. 56

Answer: B

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124. Find the angle of intersection of the circles $x^2 + y^2 - 6x + 4y + 11 = 0$ and $x^2 + y^2 - 4x + 6y + 9 = 0$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: B

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125. The value of k so that $x^2 + y^2 + kx + 4y + 2 = 0$ and $2\left(x^2 + y^2\right) - 4x - 3y + k = 0$ cut orthogonally, is

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

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

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

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

Answer: C

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126. If the circles $x^2 + y^2 + 2a'x + 2b'y + c' = 0$ and $2x^2 + 2y^2 + 2ax + 2by + c = 0$ intersect othrogonally, then prove that $aa' + \wedge(') = c + c□2'.$

A. $aa' + ' = c + c'$

B. $aa' + ' = c + \frac{c'}{2}$

C. $aa' + ' = \frac{c}{2} + c'$

D. none of these

Answer: C

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

A. $2 \text{ or } -\frac{3}{2}$

B. $-2 \text{ or } -\frac{3}{2}$

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

D. -2 or $\frac{3}{2}$

Answer: A

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128. 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

A. $x^2 + y^2 - 3x - 8y + 1 = 0$

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

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

D. $2x + 4y - 1 = 0$

Answer: C

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129. The locus of the centres of circles passing through the origin and intersecting the fixed circle $x^2 + y^2 - 5x + 3y - 1 = 0$ orthogonally is

A. a straight line of slope 3/5

B. a circle

C. a pair of straight lines

D. none of these

Answer: D

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130. 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: B::C

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131. The point from which the tangents to the circles $x^2 + y^2 - 8x + 40 = 0$, $5x^2 + 5y^2 - 25x + 80 = 0$, and

$x^2 + y^2 - 8x + 16y + 160 = 0$ are equal in length, is

A. (8, 15/2)

B. (-8, 15/2)

C. (8, -15/2)

D. none of these

Answer: C

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132. The radical axis of two circles having centres at C_1 and C_2 and radii r_1 and r_2 is neither intersecting nor touching any of the circles, if

A. $C_1C_2 = 0$

B. $0 < C_1C_2 < |r_1 - r_2|$

C. $C_1C_2 = |r_1 - r_2|$

D. $|r_1 - r_2| < C_1C_2 < r_1 + r_2$

Answer: B

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

A. $g = \frac{4}{3}$ and f=2

B. $g = \frac{4}{3}$ and $f = \frac{1}{2}$

C. $g = -\frac{3}{4}$ and $f = 2$

D. $g = \frac{3}{4}$ and $f = \frac{1}{2}$

Answer: B

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134. Let there be $n \geq 3$ circles in a plane. The value of n for which the number of radical centers is equal to the number of radical axes is (assume that all radical axes and radical centers exist and are different). a. 7 b. 6 c. 5 d. none of these

A. 3

B. 4

C. 5

D. 8

Answer: C

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135. Two equal circles with their centres as x and y axis will possess the radical axis in the following form

A. $ax - by - \frac{a^2 + b^2}{4} = 0$

B. $2gx - 2fy + g^2 - f^2 = 0$

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

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

Answer: B

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136. The equation of the circle on the common chord of the circles $(x - a)^2 + y^2 = a^2$ and $x^2 + (y + b)^2 = b^2$ as diameter, is

A. $x^2 + y^2 = 2ab(bx + ay)$

B. $x^2 + y^2 = bx + ay\big)$

C. $\left(a^2 + b^2\right)\left(x^2 + y^2\right) = 2ab(bx - ay)$

D. $\left(a^2 + b^2\right)\left(x^2 + y^2\right) = 2(bx + ay)$

Answer: C

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137. The equation of the circle and its chord are-respectively $x^2 + y^2 = a^2$ and $x\cos\alpha + y\sin\alpha = p$. The equation of the circle of which this chord isa diameter is

A. $x^2 + y^2 - 2px\cos\alpha - 2py\sin\alpha + 2p^2 - a^2 = 0$

B. $x^2 + y^2 - 2px\cos\alpha - 2py\sin\alpha + p^2 - a^2 = 0$

C. $x^2 + y^2 + 2px\cos\alpha + 2py\sin\alpha + 2p^2 - a^2 = 0$

D. none of these

Answer: A

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

A. (-5, 2)

B. (2, -5)

C. (5, -2)

D. (-2, 5)

Answer: A

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140. The equation of circle passing through $(1, -3)$ and the points common to the two circt $x^2 + y^2 - 6x + 8y - 16 = 0, x^2 + y^2 + 4x - 2y - 8 = 0$ is

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

B. $2x^2 + 2y^2 + 3x + y - 20 = 0$

C. $3x^2 + 3y^2 - 5x + 7y - 19 = 0$

D. none of these

Answer: B

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141. The equation of the circle whose diameter is the common chord of the circles; $x^2 + y^2 + 3x + 2y + 1 = 0$ & $x^2 + y^2 + 3x + 4y + 2 = 0$ is: $x^2 + y^2 + 8x + 10y + 2 = 0$ $x^2 + y^2 - 5x + 4y + 7 = 0$ $2x^2 + 2y^2 + 6x + 2y + 1 = 0$ None of these

A. $x^2 + y^2 + 8x + 10y + 2 = 0$

B. $x^2 + y^2 - 5x + 4y + 7 = 0$

C. $2x^2 + 2y^2 + 6x + 2y + 1 = 0$

D. none of these

Answer: C

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

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

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

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

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

Answer: B

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143. 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 $(-1, -1)$

A. $5x^2 + 5y^2 + 8x - 14y - 16 = 0$

B. $5x^2 + 5y^2 - 8x - 14y - 32 = 0$

C. $5x^2 + 5y^2 - 8x + 14y - 4 = 0$

D. $5x^2 + 5y6(2) + 8x + 14y + 12 = 0$

Answer: B

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144. Tangents OP and OQ are drawn from the origin o to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$. Find the equation of the circumcircle of the triangle OPQ.

A. $x^2 + y^2 + 2gx + 2fy = 0$

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

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

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

Answer: B

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145. The equation of the circle which passes through the points of intersection of the circles $x^2 + y^2 - 6x = 0$ and $x^2 + y^2 - 6y = 0$ and has its centre at (3/2, 3/2), is

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

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

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

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

Answer: C

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146. The limiting points of the system of circles represented by the equation $2\left(x^2+y^2\right)+\lambda x+\frac{9}{2}=0$, are

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

B. $(0, 0), \left(\frac{9}{2}, 0\right)$

C. $\left(\pm\frac{9}{2}, 0\right)$

D. $(\pm 3, 0)$

Answer: A

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147. The radical axis of the circles, belonging to the coaxal system of circles whose limiting points are (1, 3) and (2, 6), is

A. $x - 3y - 15 = 0$

B. $x + 3y - 15 = 0$

C. $x - 3y + 15 = 0$

D. $2x + 3y - 15 = 0$

Answer: B

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148. If (1, 2) is a limiting point of a coaxial system of circles containing the circle $x^2 + y^2 + x - 5y + 9 = 0$, then the equation of the radical axis, is

A. $x + 2y + 9 = 0$

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

C. $x + 9y - 4 = 0$

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

Answer: B

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149. The limiting points of the coaxial system containing the two circles $x^2 + y^2 + 2x - 2y + 2 = 0$ and $25\left(x^2 + y^2\right) - 10x - 80y + 65 = 0$ are

A. (1, -1), (-5, -40)

B. (1, -1), (-1/5, -8/5)

C. (-1, 1) , (1/5, 8/5)

D. (-1, 1), (-1/5, -8/5)

Answer: C

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Section I - Solved Mcqs

1. The equation $x^2 + y^2 - 6x + 8y + 25 = 0$ represents

A. a point (3, -4)

B. a pair of straight lines x=3, y=-4

C. a circle of non-zero radius

D. none of these

Answer: A

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2. The number of integral values of λ for which the equation $x^2 + y^2 - 2\lambda x + 2\lambda y + 14 = 0$ represents a circle whose radius cannot exceed 6, is

A. 10

B. 11

C. 12

D. 9

Answer: B

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3. If the equation $x^2 + y^2 + 6x - 2y + \left(\lambda^2 + 3\lambda + 12\right) = 0$ represent a circle. Then

A. $\lambda \in R$

B. $\lambda \in [1, 2]$

C. $[-2, -1]$

D. none of these

Answer: C

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4. If $2\left(x^2 + y^2\right) + 4\lambda x + \lambda^2 = 0$ represents a circle of meaningful radius, then the range of real values of λ, is

A. R

B. $(0, \infty)$

C. $(-\infty, 0)$

D. none of these

Answer: A

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5. The locus of a point which moves such that the sum of the square of its distance from three vertices of a triangle is constant is a/an circle (b) straight line (c) ellipse (d) none of these

A. circle

B. straight line

C. ellipse

D. none of these

Answer: A

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6. Prove that the locus of a point which moves such that the sum of the square of its distances from the vertices of a triangle is constant is a circle having centre at the centroid of the triangle.

A. centroid of triangle ABC

B. circumcentre of ΔABC

C. orthocentre of ΔABC

D. none of these

Answer: A

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7. The equation of the circle passing through the point (-1, 2) and having two diameters along the pair of lines $x^2 - y^2 - 4x + 2y + 3 = 0$, is

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

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

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

D. none of these

Answer: C

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8. A circle of radius 'r' passes through the origin O and cuts the axes at A and B,Locus of the centroid of triangle OAB is

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

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

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

D. none of these

Answer: D

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9. The equation $\left(x^2 - a^2\right)^2 + \left(y^2 - b^2\right)^2 = 0$ represents points

A. which are collinear

B. which lie on a circle with centre at (0, 0)

C. which lie on a circle with centre at (a, b)

D. none of these

Answer: B

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

A. 10

B. 15

C. 5

D. none of these

Answer: B

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11. If the base of a triangle and the ratio of the lengths of the other two unequal sides are given, then the vertex lies on

A. straight line

B. circle

C. ellipse

D. parabola

Answer: B

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12. Two conics $a_1x^2 + 2h_1xy + b_1y^2 = c_1, a_2x^2 + 2h_2xy + b_2y^2 = c_2$ intersect in 4 concyclic points. Then

A. $\left(a_1 - b_1 h_2 = \left(a_2 - b_2\right)h_1\right.$

B. $\left(A_1 - b_1\right)h_1 = \left(a_2 - b_2\right)h_2$

C. $\left(a_1 + b_1\right)h_2 = \left(a_2 + b_2\right)h_1$

D. $\left(a_1 + b_1\right)h_1 = \left(a_2 + b_2\right)h_2$

Answer: A

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13. The number of points with integral coordinates that are interior to the circle $x^2 + y^2 = 16$, is

A. 43

B. 49

C. 45

D. 51

Answer: C

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

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

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

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

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

Answer: A

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15. The locus of the centre of the circle which cuts the circle $x^2 + y^2 - 20x + 4 = 0$ orthogonally and touches the line $x = 2$ is

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

B. $x^2 = 16y$

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

D. $y^2 = 16x$

Answer: D

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

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

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

C. $x^2 + 8x + (y - 3)^2 = 16$

D. $(x + 4)^2 + (y - 3)^2 = 16$

Answer: D

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

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

B. $\sqrt{3}\left(x^2+y^2\right)+2y-\sqrt{3}=0$

C. $\sqrt{3}\left(x^2+y^2\right)-2y-\sqrt{3}=0$

D. none of these

Answer: C

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18. The geometric mean of the minimum and maximum values of the distance of point (-7, 2) from the points on the circle $x^2+y^2-10x-14y-51=0$ is equal to

A. $2\sqrt{11}$

B. 13

C. $5\sqrt{5}$

D. 12

Answer: A

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19. A circle passes through a fixed point A and cuts two perpendicular straight lines through A in B and C. If the straight line BC passes through a fixed-point $\left(x_1, y_1\right)$, the locus of the centre of the circle, is

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

B. $x_1 y = x_1 y_1$

C. $x y_1 + y x_1 = 2$

D. $\frac{x_1}{x} + \frac{y_1}{y} = 2$

Answer: D

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20. The equation of the circumcircle of the triangle formed by the lines whose combined equation is given by (x+y-4) (xy-2x-y+2)=0, is

A. $x^2 + y^2 - 5x - 3y + 8 = 0$

B. $x^2 + y^2 - 3x - 5y + 8 = 0$

C. $x^2 + y^2 - 3x - 5y - 8 = 0$

D. none of these

Answer: B

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21. 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

$4\left(x^2 + y^2\right) = g^2 + f^2$

$4\left(x^2 + y^2\right) = 8gx + 8fy = (1 - g)(1 + 3g) + (1 - f)(1 + 3f)$

$4\left(x^2 + y^2\right) = 8gx + 8fy = g^2 + f^2 \, none of these$

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

B. $4\left(x^2 + y^2\right) + 8gx + 8fy = g^2 + f^2$

C. $4\left(x^2 + y^2\right) + 8gx + 8fy = (1 - g)(1 + 3g) + (1 - f)(1 + 3f)$

D. none of these

Answer: C

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22. Circles are drawn through the point (3,0) to cut an intercept of length 6 units on the negative direction of the x-axis. The equation of the locus of their centres is

A. y=0

B. y=x

C. x=0

D. y=-x

Answer: C

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23. Find the locus of the centre of the circle touching the line $x + 2y = 0 and x = 2y = 0.$

A. xy=0

B. x=0

C. y=0

D. none of these

Answer: A

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24. The angle between $x^2 + y^2 - 2x - 2y + 1 = 0$ and line $y = \lambda x + 1 - \lambda$, is

A. $0°$

B. $45°$

C. $30°$

D. 90°

Answer: D

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25. The equation of the smallest circle passing from points (1, 1) and (2, 2) and always in the first quadrant is

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

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

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

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

Answer: C

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

A. 2

B. 8

C. 9

D. none of these

Answer: C

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27. The range of values of λ for which the circles $x^2 + y^2 = 4$ and $x^2 + y^2 - 4\lambda x + 9 = 0$ have two common tangents, is

A. [-13/8, 13/8]

B. $(-\infty, -13/8) \cup (13/8, \infty)$

C. $(1, 13/8)$

D. none of these

Answer: B

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28. 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 $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $-\frac{1}{4}$

A. $1/2$

B. $-1/2$

C. $1/4$

D. $-1/4$

Answer: B

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29. A chord of the circle $x^2 + y^2 = a^2$ cuts it at two points A and B such that $\angle AOB = \pi/2$, where O is the centre of the circle. If there is a moving point P on this circle, then the locus of the orthocentre of ΔPAB will be a

A. parabola

B. circle

C. straight line

D. none of these

Answer: B

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30. The lengths of the tangents from the points A and B to a circle are l_1 and l_2 respectively. If points are conjugate with respect to the circle, then $AB^2 =$

A. $l_1 + l_2$

B. $l_1^2 + l_2^2$

C. $\left|l_1^2 - l_2^2\right|$

D. none of these

Answer: B

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31. The locus of the centre of the circle passing through the origin O and the points of intersection A and B of any line through (a, b) and the coordinate axes is

A. $\frac{x}{a} + \frac{y}{b} = 1$

B. $\frac{a}{x} + \frac{b}{y} = 1$

C. $\frac{x}{a} + \frac{y}{b} = 2$

D. $\frac{a}{x} + \frac{b}{y} = 2$

Answer: D

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32. Statement I The chord of contact of tangent from three points A, B and C to the circle $x^2 + y^2 = a^2$ are concurrent, then A, B and C will be collinear. Statement II A, B and C always lie on the normal to the circle $x^2 + y^2 = a^2$.

A. be concyclic

B. be collinear

C. form the vertices of a triangle

D. none of these

Answer: B

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33. Find the condition that the chord of contact of tangents from the point (α, β) to the circle $x^2 + y^2 = a^2$ should subtend a right angle at the centre. Hence find the locus of (α, β).

A. 2a

B. a/2

C. $\sqrt{2}a$

D. a^2

Answer: C

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34. Consider a family of circles which are passing through the point $(-1, 1)$ and are tangent to x-axis. If (h, k) are the co-ordinates of the centre of the circles, then the set of values of k is given by the interval (1) $0 < k <$ (2) $k \geq$ (3) $\prec \; = k \leq$ (4) $k \leq$

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

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

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

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

Answer: D

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35. A foot of the normal from the point $(4, 3)$ to a circle is $(2, 1)$ and a diameter of the circle has the equation $2x - y - 2 = 0$. Then the equation of the circle is:

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

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

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

D. none of these

Answer: B

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36. A circle touches both the coordinate axes and the line $x - y = \sqrt{2}a, a > 0$, the coordinates of the centre of the circle cannot be

A. (a, a)

B. (a, -a)

C. (-a, a)

D. (-a, -a)

Answer: B

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

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: C

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38. If AB is the intercept of the tangent to the circle $x^2 + y^2 = r^2$ between the coordinate axes, the locus of the vertex P of the rectangle $OAPB$ is

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

B. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{1}{r^2}$

C. $\frac{1}{x^2} + \frac{1}{y^2} = r^2$

D. none of these

Answer: B

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39. The locus of the foot of the normal drawn from any point $P(\alpha, \beta)$ to the family of circles $x^2 + y^2 - 2gx + c = 0$, where g is a parameter, is

A. $\left(x^2 + y^2 + c\right)(y - \beta) = 2(ya - x\beta)x$

B. $\left(x^2 + y^2 + c\right)(x - \beta) = 2(y\alpha - x\beta)x$

C. $\left(x^2 + y^2 + c\right)(x - \beta) = 2(x\alpha - y\beta)x$

D. none of these

Answer: A

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

A. (1/2, 1/4)

B. (1/4, 1/2)

C. (1, 1/2)

D. (1/2, 1)

Answer: A

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41. The equation of a circle C_1 is $x^2 + y^2 - 4x - 2y - 11 = 0$ A circle C_2 of radius 1 rolls on the outside of the circle C_1 The locus of the centre C_2 has the equation

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

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

C. $x^2 + y^2 - 3x - y - 11 = 0$

D. none of these

Answer: A

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42. If a chord of contact of tangents drawn from a point P with respect to the circle $x^2 + y^2 = 9$ is x=2, then area, in square units, of triangle formed by tangents drawn from P to the circle and their chord of contact is equal to

A. $\frac{4\sqrt{5}}{2}$

B. $\frac{9\sqrt{3}}{2}$

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

D. none of these

Answer: C

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43. If (a, 0) is a point on a diameter of the circle $x^2 + y^2 = 4$, then the equation $x^2 - 4x - a^2 = 0$ has

A. exactly one root in [-1, 0]

B. exactly one root in [2, 5]

C. distinct roots greater than -1 and less than 5

D. all of these

Answer: D

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44. If the polar of a point (p, q) with respect to the circle $x^2 + y^2 = a^2$ touches the circle $(x - c)^2 + (y - d)^2 = b^2$, then

A. $b^2\left(p^2 + q^2\right) = \left(a^2 - cp - dq\right)^2$

B. $b^2\left(p^2+q^2\right)=\left(a^2-cq-dp\right)^2$

C. $a^2\left(p^2+q^2\right)=\left(b^2-cp-dq\right)^2$

D. none of these

Answer: A

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

B. $x^2+y^2=\frac{27}{4}$

C. $x^2+y6(2)=\frac{9}{4}$

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

Answer: C

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46. If two circles and $a(x^2 + y^2) + bx + cy = 0$ and $A(x^2 + y^2) + Bx + Cy = 0$ touch each other, then

A. aC=cA

B. bC=cB

C. aB=bA

D. a A=bB=cC

Answer: B

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47. The circles $x^2 + y^2 + 2x - 2y + 1 = 0$ and $x^2 + y^2 - 2x - 2y + 1 = 0$ touch each other

A. externally at (0, 1)

B. internally at (0, 1)

C. externally at (1, 0)

D. internally at (1, 0)

Answer: A

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48. The point of intersection of the common chords of three circles described on the three sides of a triangle as diameter is

A. centroid of the triangle

B. orthocentre of the triangle

C. circumcentre of the triangle

D. incentre of the triangle

Answer: B

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

A. all values of p

B. all except one value of p

C. all except two values of p

D. exactly one value of p

Answer: A

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50. 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. cuts the given circle orthogonally touches the given circle externally touches the given circle internally none of these

A. cuts the given circle orthogonally

B. touches the given circle externally

C. touches the given circle internally

D. none of these

Answer: A

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51. If one of the circles $x^2 + y^2 + 2ax + c = 0$ and $x^2 + y^2 + 2bx + c = 0$ lies within the other, then

A. $ab > 0, c > 0$

B. $ab > , 0, c < 0$

C. $ab < 0, c > 0$

D. none of these

Answer: A

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52. 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 $\frac{l_1 + l_2}{2}$ (b) $\frac{l_1 - l_2}{2}$ $\sqrt{l12 + l22}$ (d) $2\sqrt{l12 + l22}$

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

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

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

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

Answer: C

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53. The locus of the centre of circle which cuts off an intercept of constant length on the x-axis and which through a fixed point on the y-axis, is

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: B

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54. Let PQ and RS be tangents at the extremities of the diameter PR of a circle of radius r. If PS and RQ intersect at a point X on the circumference of the circle, then 2r equals

A. $\sqrt{PQ \times RS}$

B. $\dfrac{\sqrt{PQ \times RS}}{2}$

C. $\dfrac{2PQ \times RS}{2}$

D. $\dfrac{\sqrt{PQ^2 \times RS^2}}{2}$

Answer: A

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

A. $\left\{(x, y): x^2 = 4y\right\} \cup \{(0, y): y < 0\}$

B. $\left\{(x, y): y = x^2\right\} \cup \{0, y): y \le 0\}$

C. $\left\{(x, y): x^2 + (y - 1)^2 = 4\right\} \cup \{90, y): y < 0\}$

D. $\left\{(x, y): x^2 + 4y = 0\right\} \cup \{(0, y): y < 0\}$

Answer: A

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56. A tangent to the circle $x^2 + y^2 = 1$ through the point (0, 5) cuts the circle $x^2 + y^2 = 4$ at P and Q. If the tangents to the circle $x^2 + y^2 = 4$ at P and Q meet at R, then the coordinates of R are

A. $\left(8\sqrt{6}/5, 4/5\right)$

B. $\left(8\sqrt{6}/5\right), -4/5\right)$

C. $\left(-8\sqrt{6}/5\right), -4/5\right)$

D. none of these

Answer: A

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57. 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 $\max i\mu m o f$PA+PB` is

A. $\sqrt{a}$

B. 8

C. $\sqrt{8}$

D. $2\sqrt{8}$

Answer: A

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58. 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: C

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59. If the common chord of the circles $x^2 + (y - 2)^2 = 16$ and $x^2 + y^2 = 16$ subtend a angle at the origin then λ is equal to

A. 4

B. $4\sqrt{2}$

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

D. 8

Answer: C

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60. Two circles are given such that they neither intersect nor touch. Then identify the locus of the center of variable circle which touches both the circles externally.

A. a circle

B. an ellipse

C. a hyperbola

D. none of these

Answer: C

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

A. 3

B. 2

C. $3/2$

D. 1

Answer: B

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62. The locus of the centre of a circle touching the circle $x^2 + y^2 - 4y - 2x = 2\sqrt{3} - 1$ internally and tangents on which from (1,2) is making a 60° angle with each other is a circle. then integral part of its radius is

A. $(x - 1)^2 + (y - 2)^2 = 3$

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

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

D. none of these

Answer: D

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63. 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: A

Watch Video Solution

64. The locus of the centre of the circle passing through the intersection of the circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 2x + y = 0$ is

A. $x + 2y = 0$

B. $2x - y = 1$

C. a circle

D. a pair of lines

Answer: A

Watch Video Solution

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

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

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

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

D. none of these

Answer: B

Watch Video Solution

66. C_1 and C_2, are the two concentric circles withradii r_1 and r_2, $(r_1 < r_2)$. If the tangents drawnfrom any point of C_2, to C_1, meet again C_2, at theends of its diameter, then

A. $r_2 = 2r_1$

B. $r_2 = \sqrt{2}r_1$

C. $r_2^2 < 2r_1^2$

D. none of these

Answer: B

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

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

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

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

D. none of these

Answer: A

Watch Video Solution

68. From a point A(1, 1) on the circle $x^2 + y^2 - 4x - 4y + 6 = 0$ two equal chords AB and AC of length 2 units are drawn. The equation of chord BC, is

A. 4x+3y-12=0

B. x+y=4

C. 3x+4y=4

D. x+y=6

Answer: B

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69. The members of a family of circles are given by the equation $2\left(x^2+y^2\right)+2x-\left(1+\lambda^2\right)y-10=10$. The number of circles belonging to the family that are cut orthogonally by the fixed circle $x^2+y^2+4x+6y+3=0$ is

A. 2

B. 1

C. 0

D. none of these

Answer: A

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70. 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. (1)The equation of circle C is (2)Points E and F are given by (3)Equation of the sides QR, RP are

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

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

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

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

Answer: D

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71. If D, E and F are respectively, the mid-points of AB, AC and BC in ΔABC, then BE + AF is equal to

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

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

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

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

Answer: A

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72. In example 70, equations of the sides QR and RP are respectively

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

B. $y = \frac{x}{\sqrt{3}}$ and $y = 0$

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

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

Answer: D

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73. A point on the line x=4 from which the tangents drawn to the circle $2(x^2 + y^2) = 25$ are at right angles, is

A. (4, 3)

B. (4, 4)

C. (4, -4)

D. none of these

Answer: A

Watch Video Solution

74. The tangents PA and PB are drawn from any point P of the circle $x^2 + y^2 = 2a^2$ to the circle $x^2 + y^2 = a^2$. The chord of contact AB on extending meets again the first circle at the points A' and B'. The locus of the point of intersection of tangents at A' and B' may be given as

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

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

C. $x^2 + y^2 = 6a^2$

D. none of these

Answer: A

Watch Video Solution

75. Two concentric circles of which smallest is $x^2 + y^2 = 4$, have the difference in radii as d, if line y=x+a cuts the circles in real points, then d lies in the interval

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

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

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

D. $\left(1-\frac{1}{\sqrt{2}}, 1+\frac{1}{\sqrt{2}}\right)$

Answer: A

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76. If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ in four points $P(x_1, y_1), Q(x_2, y_2), R(x_3, y_3), S(x_4, y_4)$, then which of the following need not hold.

(a) $x_1 + x_2 + x_3 + x_4 = 0$

(b) $x_1x_2x_3x_4 = y_1y_2y_3y_4 = c^4$

(c) $y_1 + y_2 + y_3 + y_4 = 0$

(d) $x_1 + y_2 + x_3 + y_4 = 0$

A. $x_1 + x_2 + x_3 + x_4 = 01$

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

C. $x_1x_2 + x_3x_4 = c^4, y_1y_2y_3y_4 = c^4$

D. all of these

Answer: D

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77. 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 $p^2 = q^2$ (b) $p^2 = 8q^2$ $p^2 < 8q^2$ (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: D

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78. Let 'a' and 'b' be non-zero real numbers. Then, the equation $\left(ax^2 + by^2 + c\right)\left(x^2 - 5xy + 6y^2\right)$ represents :

A. four straight lines, when c = 0 and a, b are of the same sign.

B. two straight lines and a circle, when a=b, and c is of sign opposite to that of a .

C. two straight lines and a hyperbola, when a and b are of the same sign and c is of sign opposite to that of a.

D. a circle and an ellipse, when a and b are of the same sign and c is of sign opposite to that of a.

Answer: B

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79. If the circles $x^2 + y^2 + 2ax + cy + a = 0$ and points $PandQ$, then find the values of a for which the line $5x + by - a = 0$

passes through $PandQ$.

A. exactly two values of a

B. infinitely many values of a

C. no value of a

D. exactly one value of a

Answer: C

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80. Let AB be a chord of the circle $x^2 + y^2 = r^2$ subtending a right angle at the center. Then the locus of the centroid of the

ΔPAB as P moves on the circle is (1) A parabola (2) A circle (3) An ellipse (4) A pair of straight lines

A. a parabola

B. a circle

C. an ellipse

D. a pair of straight lines.

Answer: B

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81. if $a > 2b > 0$, then 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 $(x - a)^2 + y^2 = b^2$ is

A. $\dfrac{2b}{\sqrt{a^2 - 4b^2}}$

B. $\dfrac{\sqrt{a^2 - 4b^2}}{2b}$

C. $\dfrac{2b}{a - 2b}$

D. $\dfrac{b}{a - 2b}$

Answer: A

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82. A circle circumscribing an equilateral triangle with centroid at $(0, 0)$ of a side a isdrawn and a square is drawn touching its four sides to circle. The equation ofcircle circumscribing the square is :

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

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

C. $5x^2 + 5y^2 = 3a^2$

D. none of these

Answer: B

Watch Video Solution

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

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

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

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

D. $(2 - \sqrt{2})a$

Answer: A

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84. 13. The radius of a circle is 20cm. Three more concentric circles are drawn inside it in such that it is divided into four parts of equal area. The radius of the largest of the three concentric circles is

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

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

C. $\left(2 + \sqrt{2}\right)a$

D. $\left(2 - \sqrt{2}\right)a$

Answer: B

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85. If circles $x^2 + y^2 + 2x + 2y + c = 0$ and $x^2 + y^2 + 2ax + 2ay + c = 0$ where $c \in R^+, a \neq 1$ are such that one circle lies inside the other, then

A. $a \in \left(0, \sqrt{\frac{c}{2}}\right) - \{1\}$

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

C. $a \in \left(-\sqrt{\frac{c}{2}}, 0\right)$

D. none of these

Answer: D

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86. A circle is passing through the points A (1, 1) and B (1, 3) and the bisector of first and third quadrant is normal to it, then its area, in square units, is

A. 2π

B. 4π

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

D. none of these

Answer: A

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87. The equation of a circle which touches the line y = x at (1 , 1) and having y = x -3 as a normal, is

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

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

C. $x^2 + y^2 - 10x - 4y + 8 = 0$

D. none of these

Answer: A

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88. The centres 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. $3 \le x^2 + y^2 \le 9$

Answer: A

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89. 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 $|a_1a_2| = |b_1b_2|$

A. $(a_1x + b_1y + c_1)(a_2x + b_2y + c_2) + xy = 0$

B. $(a_1x + b_1y + c_1)(a_2x + b_2y + c_2) + (a_1b_2 + a_2b_1)xy = 0$

C. $(a_1x + b_1y + c_1)(a_2x + b_2y + c_2) - (a_1b_2 + a_2b_1)xy = 0$

D. $(a_1x + b_1y + c_1)(a_2x + b_2y + c_2) - (a_1b_2 - a_2b_1) = 0$

Answer: C

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90. 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]-

A. $x^2 + y^2 + 4x - 6y + 19 = 0$

B. $x^2 + y^2 - 4x - 10y + 19 = 0$

C. $x^2 + y^2 - 2x + 6y - 29 = 0$

D. $x^2 + y^2 - 6x - 4y + 19 = 0$

Answer: B

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91. A variable circle passes through the fixed $A(p, q)$ and touches the x-axis. Show that the locus of the other end of the diameter through A is (x-p)^2 = 4qy`.

A. $(y - q)^2 = 4px$

B. $(x - q)^2 = 4py$

C. $(y - p)^2 = 4qx$

D. $(x - p)^2 = 4qy$

Answer: D

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92. 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

A. 4

B. 8

C. 6

D. 3

Answer: B

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93. 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. (5/4, 0)

C. (5/2, 0)

D. (5/3, 0)

Answer: B

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94. In ΔABC, equation of side BC is x+y-6=0, also the circumcentre and orhtocentre are (3, 1) and (2, 2) respectively, then the equation of the circumcircle of ΔABC is

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

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

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

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

Answer: B

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95. 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. $20\left(x^2 + y6(2)\right) - 36x + 45y = 0$

B. $20\left(x^2 + y^2\right) + 36x - 45y = 0$

C. $36\left(x^2 + y^2\right) - 20x + 45y = 0$

D. $36\left(x^2 + y^2\right) + 20x - 45y = 0$

Answer: A

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96. A tangent PT is drawn to the circle $x^2 + y^2 = 4$ at the point $P\left(\sqrt{3}, 1\right)$. A straight line L is perpendicular to PT is a tangent to the circle $(x - 3)^2 + y^2 = 1$ Common tangent of two circle is: (A) $x = 4$ (B) $y = 2$ (C) $x + \left(\sqrt{3}\right)y = 4$ (D) $x + 2\left(\sqrt{2}\right)y = 6$

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: A

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97. A common tangent to the circles $x^2 + y^2 = 4$ and $(x - 3)^2 + y^2 = 1$, is

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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98. If the line y=mx +1 meets the circle $x^2 + y^2 + 3x = 0$ in two points equidistant and on opposite sides of x-axis, then

A. 3m-2=0

B. 2m+3=0

C. 3m+2=0

D. 2m-3=0

Answer: B

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99. If three distinct point A, B, C are given in the 2-dimensional coordinate plane such that the ratio of the distance of each one of them from the point (1, 0) to the distance from (-1, 0) is equal to $\frac{1}{2}$, then the circumcentre of the triangle ABC is at the point :

A. (3, 0)

B. (5/3, 0)

C. (1/3, 0)

D. (0, 0)

Answer: B

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100. The common tangents to the circle $x^2 + y^2 = 2$ and the parabola $y^2 = 8x$ touch the circle at P, Q andthe parabola at R, S. Then area of quadrilateral $PQRS$ is

A. 3

B. 6

C. 9

D. 15

Answer: D

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101. 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: B

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102. Given two circles $x^2 + y^2 + 3\sqrt{2}(x + y) = 0$ and $x^2 + y^2 + 5\sqrt{2}(x + y) = 0$. Let the radius of the third circle, which touches the two given circles and to their common diameter, be $\frac{2\lambda - 1}{\lambda}$ The value of λ is

A. 10

B. 8

C. 7

D. 5

Answer: B

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103. 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. $y^2 = 2x$

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

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

D. $y^2 = 1 - x$

Answer: B

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104. The circle $C_1 : x^2 + y^2 = 3$, with cenre at O, intersects the parabola $x^2 = 2y$ at the point P in the first quadrant. Let the tangent to the circle C_1 at P touches other two circles C_2 and C_3 at R_2 and R_3 respectively. Suppose C_2 and C_3 have equal radii $2\sqrt{3}$ and centres Q_2 and Q_3 respectively. If Q_2 and Q_3 lie on the y-axis, then $Q_2Q_3 =$

A. 3

B. 6

C. 9

D. 12

Answer: D

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105. In example 104, R_2R_3 =

A. $4\sqrt{6}$

B. $2\sqrt{6}$

C. $3\sqrt{6}$

D. $6\sqrt{6}$

Answer: A

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106. In example 104, area of ΔOR_2R_3, in square units, is

A. $2\sqrt{6}$

B. $3\sqrt{6}$

C. $6\sqrt{2}$

D. $6\sqrt{3}$

Answer: C

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107. In example 104, area of ΔPQ_2Q_3, in square units is

A. $6\sqrt{2}$

B. $4\sqrt{2}$

C. $8\sqrt{2}$

D. $3\sqrt{2}$

Answer: A

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108. 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?

A. 1

B. 2

C. 3

D. 4

Answer: B

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Section-I (Solved MCQs)

1. 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: A

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Section II - Assertion Reason Type

1. Tangents are drawn from the point (17, 7) to the circle $x^2 + y^2 = 169$, Statement I The tangents are mutually perpendicular Statement, Ils The locus of the points frorn which mutually perpendicular tangents can be drawn to the given circle is $x^2 + y^2 = 338$ (a) Statement I is correct, Statement II is correct; Statement II is a correct explanation for Statementl (b(Statement I is correct, Statement I| is correct Statement II is not a correct explanation for Statementl (c)Statement I is correct, Statement II is incorrect (d) Statement I is incorrect, Statement II is correct

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: C

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3. Consider three circles C_1, C_2 and C_3 as given below:

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

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

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

Statement-1: If the circle C_3 intersects C_1 orthogonally , then C_2 does not represent a circle.

Statement-2: If the circle C_3 intersects C_2 orthogonally, then C_2 and C_3 have equal radii.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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4. Statement-1: The equation $x^2 - y^2 - 4x - 4y = 0$ represents a circle with centre (2, 2) passing through the origin.

Statement-2: The equation $x^2 + y^2 + 4x + 6y + 13 = 0$ represents a point.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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5. Statement-1: If limiting points of a family of co-axial system of circles are (1, 1) and (3, 3), then $2x^2 + 2y^2 - 3x - 3y = 0$ is a member of this family passing through the origin.

Statement-2: Limiting points of a family of coaxial circles are the centres of the circles with zero radius.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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6. Statement-1: The equation of a circle through the origin and belonging to the coaxial system, of which limiting points are (1, 1) and (3, 3) is $2x^2 + 2y^2 - 3x - 3y = 0$

Statement-2: The equation of a circle passing through the points (1, 1) and (3, 3) is $2x^2 + y^2 - 2x - 6y + 6 = 0$.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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7. Statement-1: The common chord of the circles $x^2 + y^2 = r^2$ is of maximum length if $r^2 = 34$.

Statement-2: The common chord of two circles is of maximum length if it passes through the centre of the circle with smaller radius.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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8. Statement-1: The line $x + 9y - 12 = 0$ is the chord of contact of tangents drawn from a point P to the circle $2x^2 + 2y^2 - 3x + 5y - 7 = 0$.

Statement-2: The line segment joining the points of contacts of the tangents drawn from an external point P to a circle is the chord of contact of tangents drawn from P with respect to the given circle

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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9. Statement-1: The centre of the circle passing through the points (0, 0), (1, 0) and touching the circle $C: x^2 + y^2 = 9$ lies inside the circle.

Statement-2: If a circle C_1 passes through the centre of the circle C_2 and also touches the circle, the radius of the circle C_2 is twice the radius of circle C_1

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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10. Statement-1: The equation $x^3 + y^3 + 3xy = 1$ represents the combined equation of a straight line and a circle.

Statement-2: The equation of the straight line contained in $x^3 + y^3 + 3xy = 1$ is $x + y = 1$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: D

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11. The common tangents to the circles $x^2 + y^2 + 2x = 0$ and $x^2 + y^2 - 6x = 0$ form a triangle which is

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

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12. Prove that the length of the tangents drawn from an external point to a circle are equal.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: A

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Exercise

1. The centre of the circle passing through the points $(h, 0), (k.0), (0, h), (0, k)$ is

A. (a, b)

B. (a/2, b/2)

C. (-a/2, -b/2)

D. (-a, -b)

Answer: B

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2. The circle $x^2 + y^2 + 4x - 7y + 12 = 0$ cuts an intercept on y-axis equal to

A. 3

B. 4

C. 7

D. 1

Answer: D

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3. A square is inscribed in the circle $x^2 + y^2 - 2x + 4y + 3 = 0$ Its sides are parallel to the co-ordinate axes, then one vertex of the square is

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

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

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

D. none of these

Answer: D

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4. If the circle $x^2 + y^2 = a^2$ cuts off a chord of length $2b$ from the line $y = mx + c$, then

A. $\sqrt{a^2\left(a + m^2\right)} < c$

B. $\sqrt{a^2\left(1 - m^2\right)} < c$

C. $\sqrt{a^2\left(a + m^2\right)} > c$

D. $\sqrt{a^2\left(1 - m^2\right)} > c$

Answer: C

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

A. 5π

B. 10π

C. 25π

D. none of these

Answer: C

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6. For the equation $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$ where $a \neq 0$, to represent a circle, the condition will be

A. a=b and c=0

B. f=g and h=0

C. a=b and h=0

D. f=g and c=0

Answer: C

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7. The equation of the circle passing through (4, 5) having the centre (2, 2), is

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

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

C. $x^2 + y^2 - 4x - 13 = 0$

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

Answer: B

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8. Locus of centre of a circle of radius 2, which rolls on the outside of circle $x^2 + y^2 + 3x - 6y - 9 = 0$ is

A. $x^2 + y^2 + 3x - 6y + 5 = 0$

B. $x^2 + y^2 + 3x - 6y - 31 = 0$

C. $x^2 + y^2 + 3x - 6y + \frac{29}{4} = 0$

D. none of these

Answer: B

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9. Four distinct points (2k,3k) , (1,0), (0,1) and (0,0) lies on a circle for-

A. all integral values of k

B. $0 < k < 1$

C. $k < 0$

D. for two values of k

Answer: D

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10. 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: A

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

A. $(\alpha + \beta)^2 - r^2$

B. $\alpha^2 + \beta^2 - r^2$

C. $(\alpha - \beta)^2 + r^2$

D. none of these

Answer: B

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12. The equation of circles passing through $(3, -6)$ touching both the axes is

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

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

C. $x^2 + y^2 + 30x - 30y + 225 = 0$

D. $x^2 + y^2 + 30x + 30y + 225 = 0$

Answer: A

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13. The centre of a circle passing through the points (0, 0), (1, 0) and touching the circle $x^2 + y^2 = 9$, is

A. (3/2, 1/2)

B. (1/2, 3/2)

C. (1/2, 1/2)

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

Answer: D

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14. If $2x - 4y = 9$ and $6x - 12y + 7 = 0$ are parallel tangents to circle, then radius of the circle, is

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

B. $\frac{17}{6\sqrt{5}}$

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

D. $\frac{17}{3\sqrt{5}}$

Answer: B

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15. One of the diameters of the circle $x^2 + y^2 - 12x + 4y + 6 = 0$ is given by

A. $x + y = 0$

B. $x + 3y = 0$

C. $x = y$

D. $3x + 2y = 0$

Answer: B

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16. The length of the chord cut off by $y = 2x + 1$ from the circle $x^2 + y^2 = 2$ is $\frac{5}{6}$ b. $\frac{6}{5}$ c. $\frac{6}{\sqrt{5}}$ d. $\frac{\sqrt{5}}{6}$

A. $5/6$

B. $6/5$

C. $6/\sqrt{5}$

D. $\sqrt{5}/6$

Answer: C

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17. Area of the circle in which a chord of length $\sqrt{2}$ makes an angle $\frac{\pi}{2}$ at the centre,

A. $\pi/2$

B. 2π

C. π

D. $\pi/4$

Answer: C

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

A. (1, 4)

B. (2, 4)

C. (4, 1)

D. (1, 1)

Answer: A

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

A. $x^2 + y^2 - 94x + 18y + 55 = 0$

B. $15x^2 + 15y^2 - 94x + 18y + 55 = 0$

C. $15x^2 + 15y^2 + 94x + 18y + 55 = 0$

D. $x^2 + y^2 - 94x - 18y + 55 = 0$

Answer: B

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20. If the lines $3x - 4y - 7 = 0$ and $2x - 3y - 5 = 0$ are two diameters of a circle of area 49π square units, the equation of the circle is:

A. $x^2 + y^2 + 2x - 2y - 62 = 0$

B. $x^2 + y^2 - 2x + 2y - 62 = 0$

C. $x^2 + y^2 - 2x + 2y - 47 = 0$

D. $x^2 + y^2 + 2x - 2y - 47 = 0$

Answer: C

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

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

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

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

D. $6x^2 + 6y^2 - 13x = 0$

Answer: B

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22. 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 $|a_1a_2| = |b_1b_2|$

A. $|a_1 a_2| = |b_1 b_2|$

B. $|a_1 b_1| = |a_2 b_2|$

C. $|a_1 b_2| = |a_2 b_1|$

D. none of these

Answer: A

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23. If a circle passes through the points of intersection of the coordinate axes with the lines $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$, then the value of λ is............

A. 2, 1/3

B. 1/3, 1

C. 6

D. 3

Answer: A

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24. $ABCD$ is a square in first quadrant whose side is a, taking AB and AD as axes, prove that the equation to the circle circumscribing the square is $x^2 + y^2 = a(x + y)$.

A. $x^2 + y^2 + ax + ay = 0$

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

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

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

Answer: C

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25. If the points (2, 0), (0, 1), (4, 5)and (0, c) are concyclic, then the value of c, is

A. 1

B. 14/3

C. 5

D. none of these

Answer: B

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26. Find the point of intersection of the following pairs of lines:

$bx + ay = ab \text{ and } bx + by = ab$.

A. A, B, C, D are concyclic

B. A, B, C, D from a parallelogram

C. A, B, C, D form a rhombus

D. none of these

Answer: A

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27. Two perpendicular tangents to the circle $x^2 + y^2 = a^2$ meet at P. Then the locus of P has the equation

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

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

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

D. none of these

Answer: A

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28. The equation of tangents drawn from the origin to the circle

$x^2 + y^2 - 2rx - 2hy + h^2 = 0$

A. x=0, y=0

B. $y = 0, \left(h^2 - r^2\right)x - 2rhy = 0$

C. $x = 0, \left(h^2 - r^2\right)x - 2rhy = 0$

D. $x = 0, \left(h^2 - r^2\right)x + 2rhy = 0$

Answer: C

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

(A) α

(B) 2α

(C) $\frac{\alpha}{2}$

(D) $\frac{\alpha}{3}$

A. α

B. 2α

C. $\alpha/2$

D. none of these

Answer: B

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30. If the equation of a given circle is $x^2 + y^2 = 36$, then the length of the chord which lies along the line $3x + 4y - 15 = 0$ is $3\sqrt{6}$ 2. $2\sqrt{3}$ 3. $6\sqrt{3}$ 4. none of these

A. $3\sqrt{6}$

B. $2\sqrt{3}$

C. $6\sqrt{3}$

D. none of these

Answer: C

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

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

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

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

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

Answer: D

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

A. $4x^2 + 4y^2 - 30x - 10y - 25 = 0$

B. $4x^2 + 4y^2 + 30x - 13y - 25 = 0$

C. $4x^2 + 4y^2 - 17x - 10y + 25 = 0$

D. none of these

Answer: B

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33. The tangents to $x^2 + y^2 = a^2$ having inclinations α and β intersect at P. If $\cot\alpha + \cot\beta = 0$, then find the locus of P

A. $x + y = 0$

B. $x - y = 0$

C. $xy = 0$

D. none of these

Answer: C

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34. Equation of a circle with centre(4,3) touching the circle $x^2 + y^2 = 1$

A. $x^2 + y^2 - 8x - 6y - 9 = 0$

B. $x^2 + y^2 - 8x - 6y + 11 = 0$

C. $x^2 + y^2 - 8x - 6y - 11 = 0, x^2 + y^2 - 8x - 6y + 9 = 0$

D. none of these

Answer: C

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

A. 1

B. 2

C. 3

D. 4

Answer: C

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36. 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.

A. $x - 3y = 0$

B. $x + 3y = 0$

C. $3x - y = 0$

D. $2x + y = 0$

Answer: A

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

A. $\frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a^2}$

B. $\frac{1}{c^2} + \frac{1}{a^2} = \frac{1}{b^2}$

C. $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$

D. none of these

Answer: C

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

A. $g^2 + f^2$

B. $\frac{1}{2}\left(g^2 + f^2 + c\right)$

C. $\frac{g^2 + f^2 + c}{2\sqrt{g^2 + f^2}}$

D. $\frac{g^2 + f^2 - c}{2\sqrt{g^2 + f^2}}$

Answer: D

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39. 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: A

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40. The locus of the centres of the circles which touch $x^2 + y^2 = a^2$ and `x^2+y^2=4ax, externally

A. $12(x - a)^2 - 4y^2 = 3a^2$

B. $9(x - a)^2 - 5y^2 = 2a^2$

C. $8x^2 - 3(y - a)^2 = 9a^2$

D. none of these

Answer: A

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41. 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. (3, 0)

B. (0, 3)

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

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

Answer: A

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42. 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. $2x + 3y = 13, x + 5y = 17$

B. $y = 3, 12x + 5y = 39$

C. $x = 2, 9x - 11y = 51$

D. none of these

Answer: B

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43. 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

$AandB$, respectively, then the diameter of the circle is $\frac{2d_1 + d_2}{2}$

(b) $\frac{d_1 + 2d_2}{2}$ $d_1 + d_2$ (d) $\frac{d_1 d_2}{d_1 + d_2}$

A. m(m+n)

B. n(m+n)

C. m-n

D. none of these

Answer: D

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44. Find the co-ordinate of the point on the circle $x^2 + y^2 - 12x - 4y + 30 = 0$, which is farthest from the origin.

A. (9, 3)

B. (8, 5)

C. (12, 4)

D. none of these

Answer: A

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45. 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 $x = 1$ (b) $y = 2$ $x + y = 3$ (d) $x - y = 3$

A. $\pi/6$

B. $\pi/4$

C. $\pi/3$

D. $\pi/2$

Answer: D

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

A. $(x^2 + y^2) + 18x + 16y + 120 = 0$

B. $(x^2 + y^2) + 18x - 16y + 120 = 0$

C. $(x^2 + y^2) - 18x + 16y + 120 = 0$

D. $(x^2 + y^2) - 18x - 16y + 120 = 0$

Answer: D

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47. AB is a diameter of a circle and C is any point on the circle.

Show that the area of ABC is maximum, when it is isosceles.

A. the area of ΔABC is maximum when it is isosceles

B. the area of ΔABC is minimum when it is isosceles

C. the perimeter of ΔABC is maximum when it is isosceles

D. none of these

Answer: A

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48. The locus of the mid point of a chord of the circle

$x^2 + y^2 = 4$ which subtends a right angle at the origin is

A. $x + y = 2$

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

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

D. $x + y = 1$

Answer: C

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49. 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

A. (3, 1)

B. (1, 3)

C. (3, -1)

D. (-3, 1)

Answer: C

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

A. (6, -6)

B. (6, 18/5)

C. (6, -18/5)

D. none of these

Answer: B

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51. 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 $x^2 + y^2 = 25$.

A. (25, 50)

B. (-25, -50)

C. (-25, 50)

D. (25, -50)

Answer: C

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

A. $h^2 + k^2 = a^2$

B. $2\left(h^2 + k^2\right) = a^2$

C. $h^2 - k^2 = a^2$

D. $h^2 + k^2 = 2a^2$

Answer: D

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

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

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

B. $x^2 + y^2 + 2x + 4y + 1 = 0$

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

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

Answer: A

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54. The equation of the circle which passes through $(2a, 0)$ and has the radical axis $2x - a = 0$ withthe circie $x^2 + y^2 - a^2 = 0$ is

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

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

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

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

Answer: C

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55. 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 $2g'\left(g - g'\right) + 2f'\left(f - f'\right) = c - c'$

A. $2g(g - g') + 2f(f - f') = c - c'$

B. $2g(g - g') + 2f'(f - f') = c' - c$

C. $2g'(g - g') + 2f'(f - f') = c - c'$

D. $2g(g - g') + 2f(f - f') = c' - c$

Answer: C

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56. If the pole of a straight line with respect to the circle $x^2 + y^2 = a^2$ lies on the circle $x^2 + y^2 = 9a^2$, then the straight line touches the circle

A. $9a^2 = r^2$

B. $9r^2 = a^2$

C. $r^2 = a^2$

D. none of these

Answer: B

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

A. $x - 2y = 9$

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

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

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

Answer: C

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58. Locus of the mid points of the chords of the circle $x^2 + y^2 = a^2$ which pass through the fixed point (h, k) is

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

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

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

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

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

D. $x^2 + y^2 + 2hx + 2ky = 0$

Answer: A

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59. If the circles $(x - a)^2 + (y - b)^2 = c^2$ and $(x - b)^2 + (y - a)^2 = c^2$ touch each other, then

A. $a = b \pm 2c$

B. $a = b \pm \sqrt{2}c$

C. $a = b \pm c$

D. none of these

Answer: B

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60. 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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61. The number of the tangents that can be drawn from (1, 2) to $x^2 + y^2 = 5$, is

A. 1

B. 2

C. 3

D. 0

Answer: A

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62. Equation of the circle through the origin and making intercepts of 3 and 4 on the positive sides of the axes is

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

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

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

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

Answer: B

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63. If $y = 2x$ is the chord of the circle $x^2 + y^2 - 4x = 0$, find the equation of the circle with this chord as diameter.

A. y=2

B. y=1

C. x=2

D. x=1

Answer: D

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64. The tangent to $x^2 + y^2 = 9$ which is parallel to y-axis and does not lie in the third quadrant touchers the circle at the point

A. (3, 0)

B. (-3, 0)

C. (0, 3)

D. (0, -3)

Answer: A

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65. The two circles $x^2 + y^2 - 5 = 0$ and $x^2 + y^2 - 2x - 4y - 15 = 0$

A. touch each other externally

B. touch each other internally

C. cut each other orthogonally

D. do not intersect

Answer: B

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66. If the circle $x^2 + y^2 + 2x + 3y + 1 = 0$ cuts $x^2 + y^2 + 4x + 3y + 2 = 0$ at $AandB$, then find the equation of the circle on AB as diameter.

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

B. $2x^2 + 2y^2 + 2x + 6y + 1 = 0$

C. $x^2 + y^2 + x + 6y + 1 = 0$

D. none of these

Answer: B

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67. The circle $x^2 + y^2 = 4$ cuts the circle $x^2 + y^2 - 2x - 4 = 0$ at the points A and B. If the circle $x^2 + y^2 - 4x - k = 0$ passes through A and B then the value of k , is

A. -4

B. 0

C. -8

D. 4

Answer: D

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68. 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 36 (b) 144 (c) 72 (d) none of these

A. 36

B. 144

C. 72

D. none of these

Answer: C

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69. The number of common tangents of the circles $x^2 + y^2 + 4x + 1 = 0$ and $x^2 + y^2 - 2y - 7 = 0$, is

A. 1

B. 2

C. 3

D. 4

Answer: A

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70. The length of the common chord of the circles $x^2 + y^2 - 2x - 1 = 0$ and $x^2 + y^2 + 4y - 1 = 0$, is

A. $\sqrt{15/2}$

B. $\sqrt{15}$

C. $2\sqrt{15}$

D. none of these

Answer: A

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71. If a circle passes through the point (a, b) and cuts the circle $x^2 + y^2 = 4$ orthogonally, then the locus of its centre is

A. $2x + 4y - 9 = 0$

B. $2x + 4y + 9 = 0$

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

D. none of these

Answer: A

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72. If the lines $3x - 4y + 4 = 0adn6x - 8y - 7 = 0$ are tangents to a circle, then find the radius of the circle.

A. $1/4$

B. $1/2$

C. $3/4$

D. none of these

Answer: C

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73. Coordinates of the centre of the circle which bisects the circumferences of the circles $x^2 + y^2 = 1; x^2 + y^2 + 2x - 3 = 0$ and $x^2 + y^2 + 2y - 3 = 0$ is

A.)-2, 1)

B. (-2, -1)

C. (2, -1)

D. (2, 1)

Answer: B

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74. One of the diameter of a circle circumscribing the rectangle ABCD is $4y = x + 7$, If A and B are the points $(- 3, 4)$ and $(5, 4)$

respectively, then the area of rectangle is

A. 16

B. 24

C. 32

D. none of these

Answer: C

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75. The points of contact of tangents to the circle $x^2 + y^2 = 25$ which are inclined at an angle of 30° to the x-axis are

A. $(\pm 5/2, \pm 1/2)$

B. $(\pm 1/2, \pm 5/2)$

C. $(\pm 5/2, \pm 1/2)$

D. none of these

Answer: D

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76. If (m_i,1/m_i),i=1,2,3,4 are concyclic points then the value of $m_1 m_2 m_3 m_4$ is

A. 1

B. -1

C. 0

D. none of these

Answer: A

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77. 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.

A. $\frac{25}{192}$

B. $\frac{192}{25}$

C. $\frac{384}{25}$

D. none of these

Answer: B

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78. The tangent at P, any point on the circle $x^2 + y^2 = 4$, meets the coordinate axes in $A$and B, then

A. length of AB is not constant

B. PA and PB are always equal

C. the locus of the mid-point of AB is $x^2 + y^2 = x^2y^2$

D. none of these

Answer: C

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79. 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, 6

B. 2, 1

C. 3, 6

D. 6, 4

Answer: A

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80. If the chord of contact of the tangents from a point on the circle $x^2 + y^2 = a^2$ to the circle $x^2 + y^2 = b^2$ touch the circle $x^2 + y^2 = c^2$, then the roots of the equation $ax^2 + 2bx + c = 0$

are necessarily. (A) imaginary (B) real and equal (C) real and unequal (D) rational

A. imaginary

B. real and equal

C. real and unequal

D. rational

Answer: B

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81. If from the origin a chord is drawn to the circle $x^2 + y^2 - 2x = 0$, then the locus of the mid point of the chord has equation

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

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

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

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

Answer: C

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82. The locus represented by $x = \frac{a}{2}\left(t + \frac{1}{t}\right), y = \frac{a}{2}\left(t - \frac{1}{t}\right)$ is

A. an ellipse

B. a circle

C. a pair of lines

D. none of these

Answer: D

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

A. (-9/5, 12/5), (9/5, -12/5)

B. (-9/5, -12/5), (9/5, 12/5)

C. (12/5, -9/5), (-12/5, 9/5)

D. none of these

Answer: A

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84. 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.

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

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

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

D. none of these

Answer: A

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85. The two circles $x^2 + y^2 - 2x - 3 = 0$ and $x^2 + y^2 - 4x - 6y - 8 = 0$ are such that

A. they touch each other

B. they intersect each other

C. one lies inside the other

D. each lies outside the other

Answer: B

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86. The equation of the circle having its centre on the line $x + 2y - 3 = 0$ and passing through the points of intersection of the circles $x^2 + y^2 - 2x - 4y + 1 = 0 and x^2 + y^2 - 4x - 2y + 4 = 0$ is

$x^2 + y^2 - 6x + 7 = 0$ $x^2 + y^2 - 3y + 4 = 0$ c.$x^2 + y^2 - 2x - 2y + 1 = 0$

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

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

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

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

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

Answer: A

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87. The equation of the circumcircle of the triangle formed by the lines $y + \sqrt{3}x = 6, y - \sqrt{3}x = 6$ and $y = 0$, is-

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

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

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

D. $x^2 + y^2 + 4x = 12$

Answer: C

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88. The equation $x^2 + y^2 + 4x + 6y + 13 = 0$ represents

A. a circle

B. a pair of two straight lines

C. a pair of coincident straight lines

D. a point

Answer: D

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89. To which of the circles, the line $y - x + 3 = 0$ is normal at the point $\left(3 + 3\sqrt{2}, 3\sqrt{2}\right)$ is

A. $\left(x - 3 - \frac{3}{\sqrt{2}}\right)^2 + \left(y - \frac{3}{\sqrt{2}}\right)^2 = 9$

B. $\left(x - \frac{3}{\sqrt{2}}\right)^2 + \left(y - \frac{3}{\sqrt{2}}\right)^2 = 9$

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

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

Answer: D

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

A. $x^2 + y^2 - 9x + 2ky + 14 = 0$

B. $3x^2 + 3y^2 + 27x - 2ky + 42 = 0$

C. $x^2 + y^2 - 9x - 2ky + 14 = 0$

D. $x^2 + y^2 - 2kx - 9y + 14 = 0$

Answer: C

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91. 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.

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

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

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

D. $4\left(x^2 + y^2 - x - 6y\right) + 1 = 0$

Answer: A

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92. The slope of the tangent at the point (h, h) of the circle $x^2 + y^2 = a^2$, is

A. 0

B. 1

C. -1

D. depends on h

Answer: C

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93. The two circles $x^2 + y^2 = r^2$ and $x^2 + y^2 - 10x + 16 = 0$ intersect at two distinct points. Then

A. $r < 2$

B. $r > 8$

C. $2 < r < 8$

D. $2 \leq r \leq 8$

Answer: C

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94. 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: D

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95. If a circle passes through the point (a, b) and cuts the circlex $x^2 + y^2 = p^2$ equation of the locus of its centre is

A. $2ax + 2by - \left(a^2 + b^2 + p^2\right) = 0$

B. $2ax + 2by - \left(a^2 - b^2 + p^2\right) = 0$

C. $x^2 + y^2 - 3ax - 4by + \left(a^2 + b^2 - p^2\right) = 0$

D. $x^2 + y^2 - 2ax - 3by + \left(a^2 - b^2 - p^2\right) = 0$

Answer: A

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96. The locus of the mid-point of the chords of the circle $x^2 + y^2 = 4$ which subtends a right angle at the origin is $x + y = 2$ 2. $x^2 + y^2 = 1$ $x^2 + y^2 = 2$ $x + y = 1$

A. $x + y = 2$

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

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

D. $x + y = 1$

Answer: C

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

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

B. $x^2 + y^2 - 3x + 1 = 0$

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

D. none of these

Answer: B

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98. The equation of the circle described on the common chord of the circles $x^2 + y^2 + 2x = 0$ and $x^2 + y^2 + 2y = 0$ as diameter, is

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

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

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

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

Answer: D

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99. Origin is a limiting point of a coaxial system of which $x^2 + y^2 - 6x - 8y + 1 = 0$ is a member. The other limiting point, is

A. (-2, -4)

B. (3/25, 4/25)

C. (-3/25, -4/25)

D. (4/25, 3/25)

Answer: B

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

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

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

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

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

Answer: C

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101. The number of common tangents to the circles $x^2 + y^2 - x = 0$ and $x^2 + y^2 + x = 0$ are

A. 2

B. 1

C. 4

D. 3

Answer: D

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

A. these circles touch each other

B. one of these circles lies entirely inside the other

C. each of these circles lies outside the other

D. they intersect in two point

Answer: B

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103. A circle touches the x-axis and also touches the circle with center $(0, 3)$ and radius 2. The locus of the center

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: B

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104. The circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 4x + 6y + 4 = 0$

A. touch externally

B. touch internally

C. intersect in two points

D. do not intersect

Answer: C

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105. Write the equation of the unit circle concentric with $x^2 + y^2 - 8x + 4y - 8 = 0.$

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

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

C. $x^2 + y^2 - 8x + 4y - 28 = 0$

D. $x^2 + y^2 - 8x + 4y + 19 = 0$

Answer: D

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106. The point $(\sin\theta, \cos\theta)$. θ being any real number, die inside the circle $x^2 + y^2 - 2x - 2y + \lambda = 0$ if

A. $\lambda < 1 + 2\sqrt{2}$

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

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

D. $\lambda > 1 + 2\sqrt{2}$

Answer: C

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107. The range of values of $\theta \in [0, 2\pi]$ for which $(1 + \cos\theta, \sin\theta)$ is on interior point of the circle $x^2 + y^2 = 1$, is

A. $(\pi/6, 5\pi/6)$

B. $(2pu/3, 5\pi/3)$

C. $(\pi/6, 7\pi/6)$

D. $(2\pi/3, 4\pi/3)$

Answer: D

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108. The range of values of a for which the point (a, 4) is outside the circles $x^2 + y^2 + 10x = 0$ and $x^2 + y^2 - 12x + 20 = 0$, is

A. $(-\infty, -8) \cup (-2, 6) \cup (6, \infty)$

B. (-8, -2)

C. $(-\infty, -2) \cup (-2, \infty)$

D. none of these

Answer: D

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109. IF (α, β) is a point on the chord PQ of the circle $x^2 + y^2 = 25$, where the coordinates of P and Q are (3, -4) and (4, 3) respectively, then

A. $3 \leq \alpha \leq 4$ and $-4 \leq \beta \leq 3$

B. $-4 \leq \alpha \leq 3$ and $3 \leq \beta \leq 4$

C. $\alpha 3$ and $-4 \leq \beta \leq 4$

D. none of these

Answer: A

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110. If the point $(\lambda, \lambda + 1)$ lies inside the region bounded by the curve $x = \sqrt{25 + y^2}$ and $y - a\xi s,$ then λ belongs to the interval $(-1, 3)$ (b) $(-4, 3)$ (c) $(-\infty, -4) \cup (3, \infty)$ (d) none of these

A. (-4, 3)

B. $(-\infty, -1) \cup (3, \infty)$

C. (-1, 3)

D. none of these

Answer: C

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

A. $\lambda \in \left(-\infty, 5\sqrt{2}\right)$

B. $\lambda \in \left(4\sqrt{2}-\sqrt{14}, 5\sqrt{2}\right)$

C. $\lambda \in \left(4\sqrt{2}-\sqrt{14}, 4\sqrt{2}+\sqrt{14}\right)$

D. none of these

Answer: B

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112. The abscissa of the two points A and B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and their ordinates are the roots of the equation $x^2 + 2px - q^2 = 0$. Find the equation of the circle with AB as diameter. Also, find its radius.

A. $\sqrt{a^2 + p^2}$

B. $\sqrt{b^2 + q^2}$

C. $\sqrt{a^2 + b^2}$

D. $\sqrt{a^2 + b^2 + p^2 + q^2}$

Answer: D

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113. Three sided of a triangle have equations $L_1 \equiv y - m_i x = o; i = 1, 2 and 3$. Then $L_1L_2 + \lambda L_2L_3 + \mu L_3L_1 = 0$ where $\lambda \neq 0, \mu \neq 0$, is the equation of the circumcircle of the triangle if $1 + \lambda + \mu = m_1m_2 + \lambda m_2m_3 + \lambda m_3m_1$ $m_1(1 + \mu) + m_2(1 + \lambda) + m_3(\mu + \lambda) = 0$ $\frac{1}{m_3} + \frac{1}{m_1} + \frac{1}{m_1} = 1 + \lambda + \mu$

none of these

A. $\lambda\left(m_2 + m_3\right) + \mu\left(m_3 + m_1\right) + v\left(m_1 + m_2\right) = 0$

B. $\lambda\left(m_2m_3 - 1\right) + \mu\left(m_3m_1 - 1\right) + v\left(m_1m_2 - 1\right) = 0$

C. both (a) and (b) hold together

D. none of these

Answer: C

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114. if $y = mx$ is a chord of a circle of radius a and the diameter of the circle lies along x-axis and one end of this chord in origin .The equation of the circle described on this chord as diameter is

A. $\left(1 + m^2\right)\left(x^2 + y^2\right) - 2a(x + my) = 0$

B. $\left(1 - m^2\right)\left(x^2 + y^2\right) - 2a(x + my) = 0$

C. $\left(1 + m^2\right)\left(x^2 + y^2\right) + 2a(x + my) = 0$

D. none of these

Answer: A

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115. 18. The straight lines joining the origin to the points of intersection of the line $4x + 3y = 24$ with the curve

$(x - 3)^2 + (y - 4)^2 = 25$:

A. are coincident

B. are perpendicular

C. make equal angles with x-axis

D. none of these

Answer: B

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116. Find the locus of the point of intersection of tangents to the circle $x = a\cos\theta, y = a\sin\theta$ at the points whose parametric angles differ by $(i)\frac{\pi}{3}$,

A. $x^{2y^2 = \frac{r^2}{2}}$

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

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

D. none of these

Answer: B

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117. If the chord of contact of tangents from a point (x_1, y_1) to the circle $x^2 + y^2 = a^2$ touches the circle $(x - a)^2 + y^2 = a^2$, then the locus of (x_1, y_1) is

A. a circle

B. a parabola

C. an ellipse

D. a hyperbola

Answer: B

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118. The circle S_1 with centre $C_1(a_1, b_1)$ and radius r_1 touches externally the circle S_2 with centre $C_2(a_2, b_2)$ and radius r_2 If the tangent at their common point passes through the origin, then

A. $\left(a_1^2 + a_2^2\right) + \left(b_1^2 + b_2^2\right) = r_1^2 + r_2^2$

B. $\left(a_1^2 - a_2^2\right) + \left(b_1^2 - b_2^2\right) = r_1^2 - r_2^2$

C. $\left(a_1^2 - b_1^2\right) + \left(a_2^2 + b_2^2\right) = r_1^2 + r_2^2$

D. $\left(a_1^2 - b_1^2\right) + \left(a_2^2 + b_2^2\right) = r_1^2 + r_2^2$

Answer: B

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

A. $x^2 + y^2 - \frac{1}{\sqrt{3}}y - 1 = 0$

B. $x^2 + y^2 + \frac{2}{\sqrt{3}}y - 1 = 0$

C. $x^2 + y^2 - \frac{2}{\sqrt{3}}y - 1 = 0$

D. none of these

Answer: C

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120. If the sum of the coefficient in the expansion of $\left(\alpha^2x^2 - 2\alpha x + 1\right)^{51}$ vanishes, then find the value ofα

A. outside

B. inside

C. on side

D. cannot be decided

Answer: A

Watch Video Solution

121. 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. $px + qy = r/2$

B. $2px + 2py + r = 0$

C. $px + qy = r$

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

Answer: A

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122. The value of θ in $[0, 2\pi]$ so that circle $x^2 + y^2 + 2(\sin\alpha)x + 2(\cos\alpha)y + \sin^2\theta = 0$ always lies inside the square of unit side length, is/are

A. $(\pi/3, 2\pi/3)$

B. $[4\pi/3, 5\pi/3]$

C. $(\pi/4, 2\pi/3)$

D. none of these

Answer: D

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123. The value of α in $[0, 2\pi]$ so that $x^2 + y^2 + 2\sqrt{\sin\alpha x} + (\cos\alpha - 1) = 0$ having intercept on x-axis always greater than 2, is/are

A. $(\pi/4, 3\pi/2)$

B. $(\pi/4, (3\pi)/4$

C. $(\pi/4, 5\pi/4)$

D. $[0, \pi]$

Answer: B

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124. If in a ΔABC (whose circumcentre is at the origin), $a \leq \sin A$, then for any point (x, y) insidethe circumcircle of ΔABC, we have

A. $|xy| < 1/8$

B. $|xy| > 1/8$

C. $1/8 < xy < 1/2$

D. none of these

Answer: A

Watch Video Solution

125. If P is a point such that the ratio of the squares of the lengths of the tangents from P to the circles

$x^2 + y^2 + 2x - 2y - 20 = 0$ and $x^2 + y^2 - 4x + 2y - 44 = 0$ is 2:3, then the locus of P is a circle with centre

A. (7, -8)

B. (-7, 8)

C. (7, 8)

D. (-7, -8)

Answer: B

Watch Video Solution

126. If $C_1, C_2, C_3, \ldots$ is a sequence of circles such that C_{n+1} is the director circle of C_n. If the radius of C_1 is 'a', then the area bounded by the circles C_n and C_{n+1}, is

A. $2^n \pi a^2$

B. $2^{2n-n}\pi a^2$

C. $2^{n-1}\pi a^2$

D. none of these

Answer: C

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127. 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_1r_2 is $\frac{4}{41}$ (b) $\frac{41}{4}$ $\frac{5}{41}$ (d) $\frac{41}{6}$

A. $\frac{4}{41}$

B. $\frac{41}{4}$

C. $\frac{5}{41}$

D. $\frac{41}{6}$

Answer: B

Watch Video Solution

128. The radical centre of three circles described on the three sides $x + y = 5, 2x + y = \ - 9 = 0$ and $x - 2y + 3 = 0$ of a triangle as diameter, is

A. (4, 4)

B. (3, 3)

C. (3, 4)

D. (4,1)

Answer: B

Watch Video Solution

129. 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 $\frac{2ab\sin\theta}{\sqrt{a^2 + b^2 - 2ab\cos\theta}}$

A. $\frac{ab}{\sqrt{a^2 + b^2 - 2ab\cos\theta}}$

B. $\frac{2ab}{\sqrt{a^2 + b^2 - 2ab\cos\theta}}$

C. $\frac{2ab\sin\theta}{\sqrt{a^2 + b^2 - 2ab\cos\theta}}$

D. $\frac{2ab\cos\theta}{\sqrt{a^2 + b^2 - 2ab\cos\theta}}$

Answer: C

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130. 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 at most one (b) at least two exactly two (d) infinite

A. an most one

B. at least two

C. exactly two

D. infinite

Answer: A

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131. The point $\begin{pmatrix} P+1 \\ P \end{pmatrix}$ (where [.] denotes the greatest integer function), lyinginside the region bounded by the circle $x^2 + y^2 - 2x - 15 = 0$ and $x^2 + y^2 - 2x - 7 = 0$, then :

A. $a \in [-1, 0] \cup (0, 1) \cup [1, 2]$

B. $a \in [-1, 2] - \{0, 1\}$

C. $a \in (-1, 2)$

D. none of these

Answer: D

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132. The circles $ax^2 + ay^2 + 2g_1x + 2f_1y + c_1 = 0$ and $bx^2 + by^2 + 2g_2x + 2f_2y + c_2 = 0$

$(a \neq 0$ and $b \neq 0)$ cut orthogonally, if

A. an ellipse

B. the radical axis of the given circles

C. a conic

D. another circle

Answer: B

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Chapter Test

1. The two circles $x^2 + y^2 - 2x + 6y + 6 = 0$ and $x^2 + y^2 - 5x + 6y + 15 = 0$ touch eachother. The equation of their common tangent is

A. $x = 3$

B. $y = 6$

C. $7x - 12y - 21 = 0$

D. $7x + 12y + 21 = 0$

Answer: A

Watch Video Solution

2. The two circles $x^2 + y^2 - 2x - 2y - 7 = 0$ and $3\left(x^2 + y^2\right) - 8x + 29y = 0$

A. touch externally

B. touch internally

C. cut each other orthogonally

D. do not cut each other

Answer: C

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3. The centre of the circle passing through (0, 0) and (1, 0) and touching the circle $x^2 + y^2 = 9$, is

A. (3/2, 1/2)

B. (1/2, 3/2)

C. (1/2, 1/2)

D. $\left(1/2, \pm\sqrt{2}\right)$

Answer: D

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4. The circle $x^2 + y^2 = 4$ cuts the circle $x^2 + y^2 + 2x + 3y - 5 = 0$ in A and B, Then the equation of the circle on AB as diameter is

A. $13\left(x^2 + y^2\right) - 4x - 6y - 50 = 0$

B. $9\left(x^2 + y^2\right) + 8x - 4y + 25 = 0$

C. $x^2 + y^2 - 5x + 2y + 72 = 0$

D. none of these

Answer: A

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5. One of the limit point of the coaxial system of circles containing $x^2 + y^2 - 6x - 6y + 4 = 0, x^2 + y^2 - 2x - 4y + 3 = 0$, is

A. (-1, 1)

B. (-1, 2)

C. (-2, 1)

D. (-2, 2)

Answer: A

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6. A circle touches y-axis at (0, 2) and has an intercept of 4 units on the positive side of x-axis. The equation of the circle, is

A. $x^2 + y^2 - 4\left(\sqrt{2}x + y\right) + 4 = 0$

B. $x^2 + y^2 - 4\left(x + \sqrt{2}y\right) + 4 = 0$

C. $x^2 + y^2 - 2\left(\sqrt{2}x + y\right) + 4 = 0$

D. none of these

Answer: A

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7. The equation of the circle whose one diameter is PQ, where the ordinates of P, Q are the roots of the equation $x^2 + 2x - 3 = 0$ and the abscissae are the roots of the equation $y^2 + 4y - 12 = 0$ is

A. $x^2 + y^2 + 2x + 4y - 15 = 0$

B. $x^2 + y^2 - 4x - 2y - 15 = 0$

C. $x^2 + y^2 + 4x + 2y - 15 = 0$

D. none of these

Answer: C

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8. The circle $x^2 + y^2 + 4x - 7y + 12 = 0$ cuts an intercept on y-axis equal to

A. 1

B. 2

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

D. none of these

Answer: A

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

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

B. $y = mx + 3\sqrt{a + m^2}$

C. $y = mx + 3\sqrt{1 + m^2} - 2$

D. none of these

Answer: A

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10. The angle between the pair of tangents from the point $\left(1, \frac{1}{2}\right)$ to the circle $x^2 + y^2 + 4x + 2y - 4 = 0$ is

A. $\cos^{-1}. \frac{4}{5}$

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

C. $\sin^{-1}. \frac{3}{5}$

D. none of these

Answer: B

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11. The intercept on line $y = x$ by circle $x^2 + y^2 - 2x = 0$ is AB. Find equation of circle with AB as a diameter.

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

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

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

D. none of these

Answer: B

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12. 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.

A. $x - 3y = 0$

B. $x + 3y = 0$

C. $3x - y = 0$

D. $2x + y = 0$

Answer: A

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13. Locus of the middle points of chords of the circle $x^2 + y^2 = 16$ which subtend a right angle at the centre is

A. a straight line

B. a circle of radius 2

C. a circle of radius $2\sqrt{3}$

D. an ellipse

Answer: C

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14. Two tangents to the circle $x^2 + y^2 = 4$ at the points A and B meet at $P(-4, 0)$, The area of the quadrilateral $PAOB$, where O

is the origin, is

A. 4

B. $6\sqrt{2}$

C. $4\sqrt{3}$

D. none of these

Answer: C

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15. A tangent is drawn to the circle $2\left(x^2+y^2\right)-3x+4y=0$ and it touches the circle at point A. If the tangent passes through the point P(2, 1),then PA=

A. 4

B. 2

C. $2\sqrt{2}$

D. none of these

Answer: B

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16. the length of the chord of the circle $x^2 + y^2 = 25$ passing through (5, 0) and perpendicular to the line $x + y = 0$, is

A. $5\sqrt{2}$

B. $5\sqrt{2}$

C. $2\sqrt{5}$

D. none of these

Answer: A

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17. If the points A(2, 5) and B are symmetrical about the tangent to the circle $x^2 + y^2 - 4x + 4y = 0$ at the origin, then the coordinates of B, are

A. (5, -2)

B. (1, 5)

C. (5, 2)

D. none of these

Answer: C

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18. The equation of the circle of radius $2\sqrt{2}$ whose centre lies on the line $x - y = 0$ and which touches the line $x + y = 4$, and whose centre is coordinate satisfy $x + y > 4$, is

A. $x^2 + y^2 - 8x - 8y + 24 = 0$

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

C. $x^2 + y^2 - 8x + 8y - 24 = 0$

D. none of these

Answer: A

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

A. one

B. two

C. four

D. infinite

Answer: B

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20. The equation of a circle C is $x^2 + y^2 - 6x - 8y - 11 = 0$. The number of real points at which the circle drawn with points (1, 8) and (0,0) as the ends of a diameter cuts the circle, C, is

A. 0

B. 1

C. 2

D. none of these

Answer: C

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21. Two circles, each of radius 5, have a common tangent at (1, 1) whose equation is $3x + 4y - 7 = 0$. Then their centres, are

A. (4, -5), (-2, 3)

B. (4, -3), (-2, 5)

C. (4, 5), (-2, -3)

D. none of these

Answer: C

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22. The number of points on the circle $2\left(x^2 + y^2\right) = 3x$ which are at a distance 2 from the point (-2, 1), is

A. 2

B. 0

C. 1

D. none of these

Answer: B

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23. A ray of light incident at the point (-2, -1) gets reflected from the tangent at (0, -1) to the circle $x^2 + y^2 = 1$. The reflected ray touches the circle. The equation of the line along which the incident ray moved is

A. $4x - 3y + 11 = 0$

B. $4x + 3y + 11 = 0$

C. $3x + 4y + 11 = 0$

D. none of these

Answer: B

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24. The point on the straight line $y = 2x + 11$ which is nearest to the circle $16\left(x^2 + y^2\right) + 32x - 8y - 50 = 0$ is

A. (9/2, 2)

B. (-9/2, 2)

C. (9/2, -2)

D. none of these

Answer: B

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25. Extremities of a diagonal of a rectangle are (0, 0) and (4, 3). The equations of the tangents to the circumcircle of the rectangle which are parallel to the diagonal, are

A. $16x + 8y \pm 25 = 0$

B. $6x - 8y \pm 25 = 0$

C. $8 + 6y \pm 25 = 0$

D. none of these

Answer: B

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26. The equation of the circle which has a tangent $2x - y - 1 = 0$ at (3, 5) on it and with the centre on $x + y = 5$, is

A. $x^2 + y^2 + 6x - 16y + 28 = 0$

B. $x^2 + y^2 - 6x + 16y - 28 = 0$

C. $x^2 + y^2 + 6x + 6y - 28 = 0$

D. $x^2 + y^2 - 6x - 6y - 28 = 0$

Answer: A

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27. The angle of intersection of the circles $x^2 + y^2 = 4$ and $x^2 + y^2 + 2x + 2y$, is

A. $\pi/2$

B. $\pi/3$

C. $\pi/6$

D. $\pi/4$

Answer: D

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28. 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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29. The inverse point of (1, -1) with respect to $x^2 + y^2 = 4$, is

A. (-1, 1)

B. (-2, 2)

C. (1, -1)

D. (2, -2)

Answer: D

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30. A variable circle passes through the fixed point (2, 0) and touches y-axis then the locus of its centre is

A. a parabola

B. a circle

C. an ellipse

D. a hyperbola

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31. The radius of the circle $r^2 - 2\sqrt{2r}(\cos\theta + \sin\theta) - 5 = 0$, is

A. 9

B. 5

C. 3

D. 2

Answer: C

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32. A straight line of length 9 units slides with ends A, B always on x and y axes respectiv Locus of centroid of AOAB is

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

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

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

D. $x^2 + y^2 = 81$

Answer: B

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33. The radius of the larger circle lying in the first quadrant and touching the line $4x + 3y - 12 = 0$ and the coordinate axes, is

A. 5

B. 6

C. 7

D. 8

Answer: B

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34. A line is at a distance 'c' from origin and meets axes in A and B. The locus of the centre of the circle passing through O,A,B is

A. $x^{-2} + y^{-2} = 3$

B. $x^{-2} + y^{-2} = 2c^{-2}$

C. $x^{-2} + y^{-2} = 3c^{-2}$

D. $x^{-2} + y^{-2} = 4c^{-2}$

Answer: D

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35. The number of circles that touch all the straight lines $x + y - 4 = 0, x - y + 2 = 0$ and $y = 2$, is

A. 1

B. 2

C. 3

D. 4

Answer: D

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36. Find the number of integral values of λ for which $x^2 + y^2 + \lambda x + (1 - \lambda)y + 5 = 0$ is the equation of a circle whose radius does not exceed 5.

A. 14

B. 18

C. 16

D. none of these

Answer: C

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37. Show that the four points of intersection of the lines : $(2x - y + 1)$ (x-2y+3) = 0`, with the axes lie on a circle and find its centre.

A. (7/5, 5/2)

B. (7/4, 5/4)

C. (-7/4, 5/4)

D. (7/4, -5/4)

Answer: C

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38. If $2x + 3y - 6 = 0$ and $9x + 6y - 18 = 0$ cuts the axes in concyclic points, then the centre of the circle, is

A. (2, 3)

B. (3, 2)

C. (5, 5)

D. (5/2, 5/2)

Answer: D

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39. The line $lx + my + n = 0$ intersects the curve $ax^2 + 2hxy + by^2 = 1$ at the point P and Q. The circle on PQ as

diameter passes through the origin. Then $n^2(a+b)$ equals (A) l^2+m^2 (B) $2lm$ (C) l^2-m^2 (D) $4lm$

A. $n^2(a+b)$

B. $n^2(a+b)^2$

C. $n^2\left(a^2-b^2\right)$

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

Answer: A

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40. Two circles, each of radius 5, have a common tangent at (1, 1) whose equation is $3x+4y-7=0$. Then their centres, are

A. (4,-5), (-2, 3)

B. (4, -3), (-2, 5)

C. (4, 5), (-2, -3)

D. none of these

Answer: C

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41. PQ is a chord of the circle $x^2 + y^2 - 2x - 8 = 0$ whose mid-point is (2, 2). The circle passing through P, Q and (1, 2) is

A. $x^2 + y^2 - 7x + 10y + 28 = 0$

B. $x^2 + y^2 - 7x - 10y + 22 = 0$

C. $x^2 + y^2 - 7x + 10y + 22 = 0$

D. $x^2 + y^2 + 7x + 10y - 22 = 0$

Answer: B

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42. The number of circles belonging to the system of circles $2\left(x^2+y^2\right)+\lambda x-\left(1+\lambda^2\right)y-10=0$ and orthogonal to $x^2+y^2+4x+6y+3=0$, is

A. 2

B. 1

C. 0

D. none of these

Answer: A

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43. The equation of the circle passing through (0, 0) and belonging to the system of circles of which (3, 1) and (-1, 5) are limiting points, is

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

B. $x^2 + y^2 - 11x + 3y = 0$

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

D. none of these

Answer: B

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44. If $\left(-\frac{1}{3}, -1\right)$ is a centre of similitude for the circles $x^2 + y^2 = 1$ and $x^2 + y^2 - 2x - 6y - 6 = 0$, then the length of common tangent of the circles is

A. 2

B. 3

C. 4

D. 5

Answer: B

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45. If $P(1, 1/2)$ is a centre of similitude for the circles $x^2 + y^2 + 4x + 2y - 4 = 0$ and $x^2 + y^2 - 4x - 2y + 4 = 0$, then the length of the common tangent through P to the circles, is

A. 4

B. 3

C. 2

D. 1

Answer: C

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

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

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

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

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

Answer: B

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47. x=1 is the radical axis of the two orthogonally intersecting circles. If $x^2 + y^2 = 4$ is one of the circles, then the other circle, is

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

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

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

D. none of these

Answer: B

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48. If the $y = mx + 1$, of the circle $x^2 + y^2 = 1$ subtends an angle of measure 45° of the major segment of the circle then value of m is -

A. 2

B. -2

C. 1

D. none of these

Answer: C

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49. The circles $x^2 + y^2 + 6x + 6y = 0$ and $x^2 + y^2 - 12x - 12y = 0$

A. cut orthogonally

B. touch each other internally

C. intersect in two points

D. touch each other externally

Answer: D

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50. The equation of the pair of straight lines parallel to x-axis and touching the circle $x^2 + y^2 - 6x - 4y - 12 = 0,$ is

A. $y^2 - 4y - 21 = 0$

B. $y^2 + 4y - 21 = 0$

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

D. $y^2 + 4y + 21 = 0$

Answer: A

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51. The equation of the circumcircle of the triangle formed by the lines x=0, y=0, 2x+3y=5, is

A. $6\left(x^2 + y^2\right) + 5(3x - 2y) = 0$

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

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

D. $6\left(x^2 + y^2\right) - 5(3x + 2y) = 0$

Answer: D

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52. The value of λ for which the circle $x^2 + y^2 + 2\lambda x + 6y + 1 = 0$ intersects the circle $x^2 + y^2 + 4x + 2y = 0$ orthogonally, is

A. $\frac{11}{8}$

B. -1

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

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

Answer: C

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53. The equation of the circle concentric to the circle $2x^2 + 2y^2 - 3x + 6y + 2 = 0$ and having double the area of this circle, is

A. $8x^2 + 8y^2 - 24x + 48y - 13 = 0$

B. $16x^2 + 16y^2 + 24x - 48y - 13 = 0$

C. $16x^2 + 16y^2 - 24x + 48y - 13 = 0$

D. $8x^2 + 8y^2 + 24x - 48y - 13 = 0$

Answer: C

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54. 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. $x - y = 3$

Answer: B

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55. The equation of the image of the circle $(x - 3)^2 + (y - 2) = 1$ in the mirror x+y=19, is

A. $(x + 14)^2 + (y - 13)^2 = 1$

B. $(x - 15)^2 + (y - 14)^2 = 1$

C. $(x - 16)^2 + (y - 15)^2 = 1$

D. $(x - 17)^2 + \left(y - 16^2\right) = 1$

Answer: D

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