MATHS

BOOKS - VIKAS GUPTA MATHS (HINGLISH)

CIRCLE

Exercise 1 Single Choice Problems

1. The locus of mid-points of the chords of the circle $x^2 - 2x + y^2 - 2y + 1 = 0$ which are of unit length is :

A. $(x-1)^2 + (y-1)^2 = \frac{3}{4}$

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

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

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

Answer: A

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2. The length of a common internal tangent to two circles is 5 and a common external tangent is 15, then the product of the radii of the two circles is :

A. 25

B. 50

C. 75

D. 30

Answer: B

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3. A circle with center (2, 2) touches the coordinate axes and a straight line AB where A and B ie on direction of coordinate axes such that the lies

between and the line AB be the origin then the locus of circumcenter of $\triangle OAB$ will be:

A. $xy = x + y + \sqrt{x^2 + y^2}$

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

C. $xy + x + y = \sqrt{x^2 + y^2}$

D. $xy + x + y + \sqrt{x^2 + y^2} = 0$

Answer: A

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4. Length of chord of contact of point (4,4) with respect to the circle $x^2 + y^2 - 2x - 2y - 7 = 0$ is

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

B. $3\sqrt{2}$

C. 3

D. 6

Answer: B

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5. Let P, Q, R, S be the feet of the perpendiculars drawn from a point (1, 1) upon the lines $x+4y=12, x-4y+4=0$ and their angle bisectors respectively, then equation of the circle which passes through Q, R, S is :

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

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

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

D. None of these

Answer: B

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6. From a point P on the line $2x + y = 4$ which is nearest to the circle $x^2 + y^2 - 12y + 35 = 0$. tangents are drawn to give circle. The area of quadrilateral PACB (where 'C' is the center of circle and PA & PB re the tangents.) is

A. 8

B. $\sqrt{110}$

C. $\sqrt{19}$

D. None of these

Answer: C

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7. The line 2x - y + 1 = 0 is tangent to the circle at the point (2,5) and the centre of the circles lies on x-2y = 4. The radius of the circle is :

A. $3\sqrt{5}$

B. $5\sqrt{3}$

C. $2\sqrt{5}$

D. $5\sqrt{2}$

Answer: A

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8. If $A(\cos\alpha, \sin\alpha), B(\sin\alpha, -\cos\alpha), C(1, 2)$ are the vertices of a triangle, then as α varies the locus of centroid of the ΔABC is a circle whose radius is :

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

B. $\sqrt{\frac{4}{3}}$

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

D. $\sqrt{\frac{2}{9}}$

Answer: D

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9. Tangents drawn to circle $(x-1)^2 + (y-1)^2 = 5$at point P meets the line $2x + y + 6 = 0$ at Q on the axis. Length PQ is equal to

A. $\sqrt{12}$

B. $\sqrt{10}$

C. 4

D. $\sqrt{15}$

Answer: A

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10. ABCD is square in which A lies on positive y-axis and B lies on the positive x-axis. If D is the point (12, 17), then co-ordinate axis. of C is

A. (17, 12)

B. (17, 5)

C. (17, 16)

D. (15, 3)

Answer: B

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11. Statement-1: The lines $y = mx + 1 - m$ for all values of m is a normal to the circle $x^2 + y^2 - 2x - 2y = 0$.

Statement-2: The line L passes through the centre of the circle.

A. Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

B. Statement-1 is true, statement-2 is true and statement-2 is not the 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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12. A(1, 0) and 0, 1) are two fixed points on the circle $x^2 + y^2 = 1$. C is a variable point on this circle. As C moves, the locus of the orthocentre of the triangle ABC is

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

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

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

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

Answer: A

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13. Equation of a circle passing through (1, 2) and (2, 1) and for which line $x + y = 2$ is a diameter, is :

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

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

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

D. None of these

Answer: C

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14. The area of an equilateral triangle inscribed in a circle of radius $4cm$, is

A. $12cm^2$

B. $9\sqrt{3}cm^2$

C. $8\sqrt{3}cm^2$

D. $12\sqrt{3}cm^2$

Answer: D

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15. let all the points on the curve $x^2 + y^2 - 10x = 0$ are reflected about the line $y = x + 3$. The locus of the reflected points is in the form $x^2 + y^2 + gx + fy + c = 0$.The value of $g + f + c$ is equal to

A. 28

B. -28

C. 38

D. -38

Answer: C

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16. The shortest distance from the line $3x + 4y = 25$ to the circle $x^2 + y^2 = 6x - 8y$ is equal to :

A. $7/5$

B. $9/5$

C. $11/5$

D. $32/5$

Answer: A

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

A. $10\sqrt{3}$

B. $10\sqrt{5}$

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

D. $10 + 5\pi$

Answer: C

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18. A circle is inscribed in an equilateral triangle with side lengths 6 unit. Another circle is drawn inside the triangle (but outside the first circle), tangent to the first circle and two of the sides of the triangle. The radius of the smaller circle is

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

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

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

D. 1

Answer: A

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19. The equation of tangent to the circle $x^2 + y^2 - 4x = 0$ which is perpendicular to the normal drawn through the origin can be : (A) $x = 0$ (B) $x = 4$ (C) $x + y = 2$ (D) none of these

A. $x = 1$

B. $x = 2$

C. $x + y = 2$

D. $x = 4$

Answer: D

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20. the equation of the line parallel to the line $3x + 4y = 0$ and touching the circle $x^2 + y^2 = 9$ in the first quadrant is:

A. $3x + 4y = 15$

B. $3x + 4y = 45$

C. $3x + 4y = 9$

D. $3x + 4y = 12$

Answer: A

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21. The centres of the three circles $x^2 + y^2 - 10x + 9 = 0, x^2 + y^2 - 6x + 2y + 1 = 0, x^2 + y^2 - 9x - 4y +$

A. lie on the straight line $x - 2y = 5$

B. lie on circle $x^2 + y^2 = 25$

C. do not lie on straight line

D. lie on circle $x^2 + y^2 + x + y - 17 = 0$

Answer: C

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22. The equation of diameter of a circle $x^2 + y^2 + 2x - 4y = 4$, that is parallel to $3x + 5y = 4$ is

A. $3x + 5y = -7$

B. $3x + 5y = 7$

C. $3x + 5y = 9$

D. $3x + 5y = 1$

Answer: B

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23. There are 2 circles passing through points A(-1, 2) and B(2, 3) having radius $\sqrt{5}$. Then the length of intercept on axis of the circle intersecting x-axis is :

A. 2

B. 3

C. 4

D. 5

Answer: C

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24. A square OABC is formed by line pairs $xy = 0$ and $xy + 1 = x + y$ where o is the origin . A circle with circle C_1 inside the square is drawn to touch the line pair $xy = 0$ and another circle with centre C_2 and radius twice that C_1 is drawn touch the circle C_1 and the other line .The radius of the circle with centre C_1

A. $\dfrac{\sqrt{2}}{\sqrt{3}\left(\sqrt{2}+1\right)}$

B. $\dfrac{2\sqrt{2}}{3\left(\sqrt{2}+1\right)}$

C. $\dfrac{\sqrt{2}}{3\left(\sqrt{2}+1\right)}$

D. $\dfrac{\sqrt{2}+1}{3\sqrt{2}}$

Answer: C

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25. The equation of the circle circumscribing the triangle formed by the points (3, 4), (1, 4) and (3, 2) is :

A. $8x^2 + 8y^2 - 16x - 13y = 0$

B. $x^2 + y^2 - 4x - 8y + 19 = 0$

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

D. $x^2 + y^2 - 6x - 6y + 17 = 0$

Answer: C

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26. The equation of the tangent to circle $x^2 + y^2 + 2gx + 2fy = 0$ at origin is :

A. $fx + gy = 0$

B. $gx + fy = 0$

C. $x = 0$

D. $y = 0$

Answer: B

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27. The line $y = x$ is a tangent at $(0, 0)$ to a circle of radius unity. The center of the circle is

A. either $\left(-\frac{1}{2}, \frac{1}{2}\right)$ or $\left(\frac{1}{2}, -\frac{1}{2}\right)$

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

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

D. either (1, 0) or (-1, 0)

Answer: C

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28. 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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29. In a right triangle ABC, right angled at A, on the leg AC as diameter, a semicircle is described. The chord joining A with the point of intersection D of the hypotenuse and the semicircle, then the length AC equals to

A. $\dfrac{AB \cdot AB}{\sqrt{AB^2 + AB^2}}$

B. $\dfrac{AB \cdot AD}{AB + AD}$

C. $\sqrt{AB \cdot AD}$

D. $\dfrac{AB \cdot AD}{\sqrt{AB^2 - AD^2}}$

Answer: D

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30. 30. Radical centre of circles drawn on the sides as a diameter of triangle formed by the lines the $3x - 4y + 6 = 0$, $x - y + 2 = 0$ and $4x + 3y - 17 = 0$ is

A. (3, 2)

B. (3, -2)

C. (2, -3)

D. (2, 3)

Answer: D

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31. Statement-1: A circle can be inscribed in a quadrilateral whose sides are $3x - 4y = 0, 3x - 4y = 5, 3x + 4y = 0$ and $3x + 4y = 7$ Statement-2: A circle can be inscribed in a parallelogram if and only if it is a rhombus (a) statement-1 is true, statement-2 is true and statement-2 is correct explanation for Statement-1. (b) Statement-1 is true, statement-2 is true and statement-2 is not the correct explanation for statement-1. (c) Statement-1 is true, statement-2 is false. d) Statement-1 is false, statement-2 is true

A. Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

B. Statement-1 is true, statement-2 is true and statement-2 is not the 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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32. If $x = 3$ is the chord of the contact of the circle $x^2 + y^2 = 81,$ then the equation of the corresponding pair of tangents, is

A. $x^2 - 8y^2 + 54x + 729 = 0$

B. $x^2 - 8y^2 - 54x + 729 = 0$

C. $x^2 - 8y^2 - 54x - 729 = 0$

D. $x^2 - 8y^2 = 729$

Answer: B

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33. The shortest distance from the line $3x + 4y = 25$ to the circle $x^2 + y^2 = 6x - 8y$ is equal to :

A. $\frac{7}{3}$

B. $\frac{9}{5}$

C. $\frac{11}{5}$

D. $\frac{7}{5}$

Answer: D

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

A. $\tan^{-1}\frac{4}{3}$

B. $\cot^{-1}(-1)$

C. $\tan^{-1}1$

D. $\cot^{-1}\frac{4}{3}$

Answer: C

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35. 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. $\sqrt{a^2 + b^2 + p^2 + q^2}$

B. $\sqrt{a^2 + p^2}$

C. $\sqrt{b^2 + q^2}$

D. $\sqrt{a^2 + b^2 + p^2 + 1}$

Answer: A

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

A. $x_1x_2 = 1$

B. $x_1x_2 = -1$

C. $x_1 + x_2 = 1$

D. $4x_1x_2 = 1$

Answer: A

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37. A circle bisects the circumference of the circle $x^2 + y^2 + 2y - 3 = 0$ and touches the line $x = y$ at the point $(1, 1)$. Its radius is

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

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

C. $4\sqrt{2}$

D. $3\sqrt{2}$

Answer: B

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

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

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

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

Answer: C

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39. If the tangents AB and AQ are drawn from the point A(3, -1) to the circle $x^2+y^2-3x+2y-7=0$ and C is the centre of circle, then the area of quadrilateral APCQ is :

A. 9

B. 4

C. 2

D. non-existent

Answer: D

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40. Number of integral value(s) of k for which no tangent can be drawn from the point $(k, k+2)$ to the circle $x^2 + y^2 = 4$ is :

A. 0

B. 1

C. 2

D. 3

Answer: B

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41. If the length of the normal for each point on a curve is equal to the radius vector, then the curve (a) is a circle passing through origin (b) is a circle having centre at origin and radius 0 (c) is a circle having centre on x-axis and touching y-axis (iv) is a circle having centre on y-axis and touching x-axis

A. is a circle passing through origin

B. is a circle having centre at origin and radius gt 0

C. is a circle having centre on x-axis and touching y-axis

D. is a circle having centre on y-axis and touching x-axis

Answer: B

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

A. (1, 0)

B. (0, 1)

C. (0, -1)

D. (-1, 0)

Answer: D

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43. A variable circle is drawn to touch the x-axis at the origin. The locus of the pole of the straight line $lx+my+n=0$ w.r.t the variable circle has the equation:

A. $x(my-n)-ly^2=0$

B. $x(my+n)-ly^2=0$

C. $x(my-n)+ly^2=0$

D. None of these

Answer: A

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44. The minimum length of the chord of the circle $x^2 + y^2 + 2x + 2y - 7 = 0$ which is passing (1,0) is :

A. 2

B. 4

C. $2\sqrt{2}$

D. $\sqrt{5}$

Answer: B

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45. (C) 2 45. Three concentric circles of which the biggest is $x^2 + y^2 = 1$, have their radii in A.P If the line $y = x + 1$ cuts all the circles in real and distinct points. The interval in which the common difference of the A.P will lie is:

A. $\left(0, \frac{1}{4}\right)$

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

C. $\left(0, \frac{2-\sqrt{2}}{4}\right)$

D. none

Answer: C

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46. The locus of the point of intersection of the tangent to the circle x^2+y^2=a^2 ,which include an angle of 45@ is is the curve (x^2+y^2)^2 = lembd(a^2)(x^2+y^2=a^2). the value of lambda is : (a) 2 (b) 4 (c)8 (d) 16

A. 2

B. 4

C. 8

D. 16

Answer: C

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47. A circle touches the line $y = x$ at point $(4, 4)$ on it. The length of the chord on the line $x + y = 0$ is $6\sqrt{2}$. Then one of the possible equation of the circle is

A. $x^2 + y^2 + x - y + 30 = 0$

B. $x^2 + y^2 + 2x - 18y + 32 = 0$

C. $x^2 + y^2 + 2x + 18y + 32 = 0$

D. $x^2 + y^2 - 2x - 22y + 32 = 0$

Answer: B

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48. Point on the circle $x^2 + y^2 - 2x + 4y - 4 = 0$ which is nearest to the line $y = 2x + 11$ is :

A. $\left(1-\frac{6}{\sqrt{5}}, -2+\frac{3}{\sqrt{5}}\right)$

B. $\left(1+\frac{6}{\sqrt{5}}, 2-\frac{3}{\sqrt{5}}\right)$

C. $\left(1-\frac{6}{\sqrt{5}}, -2-\frac{3}{\sqrt{5}}\right)$

D. None of these

Answer: A

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

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

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

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

Answer: C

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50. If $\left(a, \frac{1}{a}\right), \left(b \frac{.1}{b}\right), \left(c, \frac{1}{c}\right), \left(d, \frac{1}{d}\right)$ are four distinct points on a circle of radius 4 units then, $abcd$ is equal to:

A. 4

B. $1/4$

C. 1

D. 16

Answer: C

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Exercise 2 One Or More Than One Answer Is Are Correct

1. Number of circle touching both the axes and the line $x + y = 4$ is greater than or equal to :

A. 1

B. 2

C. 3

D. 4

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

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2. Which of the following is/are true ? The circles $x^2 + y^2 - 6x + 6y + 9 = 0$ and $x^2 + y^2 + 6x + 6y + 9 = 0$ are such that :

A. They do not intersect

B. They touch each other

C. Their exterior common tangents are parallel

D. Their interior common tangents are perpendicular

Answer: A::C::D

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3. Let α be a variable parameter, then the length of the chord of the curve: $(x - \sin^{-1}\alpha)(x - \cos^{-1}\alpha) + (y - \sin^{-1}\alpha)(y + \cos^{-1}\alpha) = 0$ along the line $x = \frac{\pi}{4}$ can not be equal to

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

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

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

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

Answer: A::B::C

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4. The point $(1, 4)$ are inside the circle $S: x^2 + y^2 - 6x - 10y + k = 0$. What are the possible values of k if the circle S neither touches the axes nor cut them

A. $p < 29$

B. $p > 25$

C. $p > 27$

D. $p < 27$

Answer: A::B

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5. The equation of a circle C_1 is $x^2 + y^2 = 4$. The locus of the intersection of orthogonal tangents to the circle is the curve C_2 and the locus of the intersection of perpendicular tangents to the curve C_2 is the curve C_3, Then

A. C_2 is a circle

B. C_1, C_2 are circles having different centres

C. C_1, C_2 are circles having same centres

D. area enclosed between C_1 and C_2 is 8π

Answer: A::C::D

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6. 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. $p^2 > q^2$

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

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

Answer: B::D

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7. If

$a = \max\left\{(x+2)^2 + (y-3)^2\right\}$ and $b = \min\left\{(x+2)^2 + (y-3)^2\right\}$

where x, y satisfying $x^2 + y^2 + 8x - 10y - 40 = 0$ then :

A. $a + b = 18$

B. $a + b = 178$

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

D. $a - b = 72\sqrt{2}$

Answer: B::D

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8. The locus of points of intersection of the tangents to $x^2+y^2=a^2$ at the extremeties of a chord of circle $x^2+y^2=a^2$ which touches the circle $x^2+y^2-2ax=0$ is/are :

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

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

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

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

Answer: A::C

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9. A circle passes through the points (-1,1), (0,6) and (5.5). The point(s) on this circle,the tangents at which is/are parallel to the straight line joining the origin to its centre is/are:

A. (1, -5)

B. (5, 1)

C. (-5, -1)

D. (-1, 5)

Answer: B::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. (8, 5)

B. (8, 9)

C. (-6, 5)

D. (-6, -9)

Answer: A::C

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Exercise 3 Comprehension Type Problems

1. Let each of the circles,

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

$S_2 = x^2 + y^2 + 6x + y + 8 = 0,$

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

touches the other two. Let P_1, P_2, P_3 be the points of contact of S_1 and S_2, S_2 and S_3, S_3 and S_1 respectively and C_1, C_2, C_3 be the centres of S_1, S_2, S_3 respectively.

Q. The co-ordinates of P_1 are :

A. (2, -1)

B. (2, 1)

C. (-2, 1)

D. (-2, -1)

Answer: D

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2. Let each of the circles,

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

$S_2 = x^2 + y^2 + 6x + y + 8 = 0,$

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

touches the other two. Let P_1, P_2, P_3 be the points of contact of S_1 and S_2, S_2 and S_3, S_3 and S_1 respectively and C_1, C_2, C_3 be the centres of S_1, S_2, S_3 respectively.

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

A. $3 : 2$

B. $2 : 5$

C. $5:3$

D. $2:3$

Answer: B

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3. Let each of the circles,

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

$S_2 = x^2 + y^2 + 6x + y + 8 = 0,$

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

touches the other two. Let P_1, P_2, P_3 be the points of contact of S_1 and S_2, S_2 and S_3, S_3 and S_1 respectively and C_1, C_2, C_3 be the centres of S_1, S_2, S_3 respectively.

Q. P_2 and P_3 are image of each other with respect to line :

A. $y = x + 1$

B. $y = -x$

C. $y = x$

D. $y = -x + 2$

Answer: C

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4. Let A(3, 7) and B(6, 5) are two points. $C: x^2 + y^2 - 4x - 6y - 3 = 0$ is a circle.

Q. The chords in which the circle C cuts the members of the family S of circle passing through A and B are concurrent at:

A. (2, 3)

B. $\left(2, \frac{23}{3}\right)$

C. $\left(3, \frac{23}{2}\right)$

D. (3, 2)

Answer: B

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5. Let A(3, 7) and B(6, 5) are two points. $C: x^2 + y^2 - 4x - 6y - 3 = 0$ is a circle.

Q. Equation of the member of the family of circles S that bisects the circumference of C is :

A. $x^2 + y^2 - 5x - 1 = 0$

B. $x^2 + y^2 - 5x + 6y - 1 = 0$

C. $x^2 + y^2 - 5x - 6y - 1 = 0$

D. $x^2 + y^2 + 5x - 6y - 1 = 0$

Answer: C

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6. Let A(3, 7) and B(6, 5) are two points. $C: x^2 + y^2 - 4x - 6y - 3 = 0$ is a circle.

Q. If O is the origin and P is the center of C, then absolute value of difference of the squares of the lengths of the tangents from A and B to the circle C is equal to :

A. $(AB)^2$

B. $(OP)^2$

C. $\left|(AP)^2 - (BP)^2\right|$

D. $(AP)^2 + (BP)^2$

Answer: C

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7. Let the diameter of a subset S of the plane be defined as the maximum of the distance between arbitrary pairs of points of S.

Q. Let $S = \{(x, y) : (y - x) \leq 0, x + y \geq 0, x^2 + y^2 \leq 2\}$ then the diameter of S is :

A. 2

B. 4

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer: A

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8. Let the diameter of a subset S of the plane be defined as the maximum of the distance between arbitrary pairs of points of S.

Q. Let

$$S = \left\{(x, y) : (\sqrt{5}-1)x - \sqrt{10+2\sqrt{5}}y \geq 0, (\sqrt{5}-1)x + \sqrt{10+12\sqrt{5}}y$$

then the diameter of S is :

A. $\frac{3}{2}(\sqrt{5}-1)$

B. $3(\sqrt{5}-1)$

C. $3\sqrt{2}$

D. 3

Answer: D

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9. Let L_1, L_2 and L_3 be the lengths of tangents drawn from a point P to circles $x^2 + y^2 = 4, x^2 + y^2 - 4x = 0$ and $x^2 + y^2 - 4y = 0$ respectively. If $L_1^4 = L_2^2 L_3^2 + 16$ then the locus of P are the curves, C_1 (a straight line) and C_2 (a circle).

Q. Circum centre of the triangle formed by C_1 and two other lines which are at angle of 45° with C_1 and tangent of C_2 is :

A. (1, 1)

B. (0, 0)

C. (-1, -1)

D. (2, 2)

Answer: B

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10. Let L_1, L_2 and L_3 be the lengths of tangents drawn from a point P to circles $x^2 + y^2 = 4, x^2 + y^2 - 4x = 0$ and $x^2 + y^2 - 4y = 0$ respectively. If $L_1^4 = L_2^2 L_3^2 + 16$ then the locus of P are the curves, C_1 (a straight line) and C_2 (a circle).

Q. If S_1, S_2 and S_3 are three circles congruent to C_2 and touch both C_1 and C_2, then the area of triangle formed by joining centres of the circles S_1, S_2 and S_3 is (in square units)

A. 2

B. 4

C. 8

D. 16

Answer: C

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Exercise 5 Subjective Type Problems

1. Tangents are drawn to circle $x^2 + y^2 = 1$ at its iontersection points (distinct) with the circle $x^2 + y^2 + (\lambda - 3)x + (2\lambda + 2)y + 2 = 0$. The locus of intersection of tangents is a straight line, then the slope of that straight line is .

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2. The radical centre of the three circles is at the origin. The equations of the two of the circles are $x^2 + y^2 = 1$ and $x^2 + y^2 + 4x + 4y - 1 = 0$. If the third circle passes through the points (1, 1) and (-2, 1), and its radius can be expressed in the form of $\frac{p}{q}$, where p and q are relatively prime positive integers. Find the value of $(p + q)$.

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3. Let $S = \{(x, y) \mid x, y \in R, x^2 + y^2 - 10x + 16 = 0\}$. The largest value of $\frac{y}{x}$ can be put in the form of $\frac{m}{n}$ where m, n are relatively prime natural numbers, then $m^2 + n^2 =$

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4. In the above problem, the complete range of the expression $x^2 + y^2 - 26x + 12y + 210$ is [a, b], then $b - 2a =$

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5. If the line y=2-x is tangent to the circle S at the point P(1,1) and circle S is orthogonal to the circle $x^2 + y^2 + 2x + 2y - 2 = 0$ then find the length of tangent drawn from the point (2,2) to the circle S

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6. Two circles having radii r_1 and r_2 passing through vertex A of triangle ABC. One of the circle touches the side BC at B and the other circle touches the side BC at C. If a =5cm and $A = 30^\circ$ find $\sqrt{r_1 r_2}$

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7. a circles S of radius 'a' is the director circle of another circle S_1. S_2 is the director circle of S_2 and so on. If the sum of radius of $S, S_1, S_2, S_3 \ldots$ circles is '2' and $a = (k - \sqrt{k})$, then the value of k is ......

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8. If r_1 and r_2 be the maximum and minimum radius of the circle which pass through the point (4, 3) and touch the circle $x^2 + y^2 = 49$, then $\frac{r_1}{r_2}$ is ....

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9. Let C be the circle $x^2 + y^2 - 4x - 4y - 1 = 0.$ The number oof points common to C and the sides of the rectangle determined by the lines $x = 2, x = 5, y = -1$ and $y = 5$ equal to

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

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11. The sum of abscissa and ordinate of a point on the circle $x^2 + y^2 - 4x + 2y - 20 = 0$ which is nearest to $\left(2, \frac{3}{2}\right)$ is :

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12. AB is any chord of the circle $x^2 + y^2 - 6x - 8y - 11 = 0$ which subtends an angle $\frac{\pi}{2}$ at $(1, 2)$. If locus of midpoint of AB is a circle $x^2 + y^2 - 2ax - 2by - c = 0$; then find the value of $(a + b + c)$.

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13. If circles $x^2 + y^2 = c$ with radius $\sqrt{3}$ and $x^2 + y^2 + ax + by + c = 0$ with radius $\sqrt{6}$ intersect at two points A and B. If length of $AB = \sqrt{l}$. Find l.

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