MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

CIRCLES

Single Correct Answer Type

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

A. 1

B. -1

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

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

Answer: C

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

A. $(2, 5)$

B. $(-2, -5)$

C. $(-5, -2)$

D. $(5, 2)$

Answer: D

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

A. 2

B. 4

C. 8

D. 0

Answer: D

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

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

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

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

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

Answer: D

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

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

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

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

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

Answer: B

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6. a circle passing through the point $(2, 2(\sqrt{2}-1))$ touches the pair of lines $x^2-y^2-4x+4=0$. The centre of the circle is

A. $\left(2, 2\sqrt{2}\right)$ and $\left(2, 6\sqrt{6} - 8\right)$

B. $\left(2, 5\sqrt{2}\right)$ and $\left(2, 7\sqrt{2}\right)$

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

D. None of these

Answer: A

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

A. $l < 8$

B. $l < 16$

C. $l > 8$

D. $l > 16$

Answer: A

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

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

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

C. 1

D. 2

Answer: B

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

A. 14

B. 15

C. 16

D. none of these

Answer: B

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

A. 1

B. 2

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

D. 4

Answer: D

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

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

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

C. $\pi / 4$

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

Answer: C

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

A. A,B,C and P

B. P but not on C

C. P and C only

D. the radius of S only

Answer: B

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

A. 1

B. 1.5

C. 2

D. None of these

Answer: A

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

A. 6

B. 8

C. 4

D. 12

Answer: B

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

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

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

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

D. None of these

Answer: B

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

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

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

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

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

Answer: B

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17. If the curves $\frac{x^2}{4} + y^2 = 1$ and $\frac{x^2}{a^2} + y^2 = 1$ for a suitable value of a cut on four concyclic points, the equation of the circle passing through these four points is

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

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

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

D. none of these

Answer: B

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

A. 1.5 units

B. 2 units

C. 2.5 units

D. 3 units

Answer: D

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19. AB is a chord of the circle $x^2 + y^2 = \frac{25}{2}$ .P is a point such that PA = 4, PB = 3. If AB = 5, then distance of P from origin can be:

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

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

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

D. $\frac{7}{\sqrt{2}}$ or $\frac{1}{\sqrt{2}}$

Answer: D

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20. chord AB of the circle $x^2 + y^2 = 100$ passes through the point $(7, 1)$ and subtends are angle of 60° at the circumference of the circle. if m_1 and m_2 are slopes of two such chords then the value of $m_1 \cdot m_2$ is

A. -1

B. 1

C. $7/12$

D. -3

Answer: A

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21. P and Q are two points on a line passing through (2, 4) and having slope m. If a line segment AB subtends a right angles at P and Q, where A(0, 0) and B(6,0), then range of values of m is

A. $\left(\frac{2-3\sqrt{2}}{4}, \frac{2+3\sqrt{2}}{4}\right)$

B. $\left(-\infty, \frac{2-3\sqrt{2}}{4}\right) \cup \left(\frac{2+3\sqrt{2}}{4}, \infty\right)$

C. $(-4, 4)$

D. $(-\infty, -4) \cup (4, \infty)$

Answer: B

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22. In the xy-plane, the length of the shortest path from (0,0) to (12,16) that does not go inside the circle $(x-6)^2+(y-8)^2=25$ is

$10\sqrt{3}$

$10\sqrt{5}$

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

$10+5\pi$

A. $10\sqrt{3}$

B. $10\sqrt{5}$

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

D. $10+5\pi$

Answer: C

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

A. $6\sqrt{21}$

B. $6\sqrt{26}$

C. 30

D. 32

Answer: B

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

A. 154

B. 124

C. 172

D. 128

Answer: A

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

A. 1.5

B. 2

C. 4.5

D. 3

Answer: D

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

A. 20

B. -28

C. -30

D. none of these

Answer: B

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

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

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

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

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

Answer: B

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

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

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

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

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

Answer: C

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

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

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

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

D. none of these

Answer: C

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

A. $x_1x_2 = 1$

B. $x_1x_2 = -1$

C. $x_1 + x_2 = 1$

D. $4x_1x_2 = 1$

Answer: A

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

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

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

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

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

Answer: C

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

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

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

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

D. $m > -1$

Answer: A

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

A. 1

B. 2

C. 3

D. 4

Answer: A

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

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

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

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

D. none of these

Answer: D

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

A. $(4, 5)$

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

C. $(4, -5)$

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

Answer: D

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

A. $3\sqrt{2}$

B. 6

C. 8

D. 10

Answer: C

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37. Consider circles

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

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

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

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

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

A. statement II is false and statement I is true

B. statement I is false and statement II is true

C. both the statements are false

D. both the statements are true

Answer: B

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

A. equilateral triangle

B. right angle triangle

C. obtuse angle triangle

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

Answer: A

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

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

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

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

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

Answer: D

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

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $4\sqrt{2}$

Answer: B

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

A. 4

B. 5

C. 6

D. 9.25

Answer: B

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

A. 3 units

B. 6 units

C. 4 units

D. 5 units

Answer: C

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

A. $6x + 8y = 41$

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

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

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

Answer: A

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

A. $2\sqrt{2}$

B. $\sqrt{2}$

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

D. none of these

Answer: A

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

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

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

C. 3

D. 2

Answer: A

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

A. 10

B. 9

C. 8

D. 7

Answer: C

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

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

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

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

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

Answer: D

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

A. $px + qy = r$

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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

A. $\sqrt{20}$

B. $\sqrt{22}$

C. $\sqrt{30}$

D. $\sqrt{32}$

Answer: B

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

A. 13

B. 15

C. 19

D. 23

Answer: A

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52. The locus of the mid-points of the chords of the circle of lines radiÃ¹s r which subtend an angle $\frac{\pi}{4}$ at any point on the circumference of the circle is a concentric circle with radius equal to (a) $\frac{r}{2}$ (b) $\frac{2r}{3}$ (c) $\frac{r}{\sqrt{2}}$ (d) $\frac{r}{\sqrt{3}}$

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

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

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

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

Answer: C

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

$25(x^2 + y^2) = 3(x + y)$ $5(x^2 + y^2) = 3(x + y)$

$none of these$

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

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

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

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

Answer: A

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

A. circle

B. line

C. parabola

D. ellipse

Answer: C

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

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

B. $y^2 \leq 4ax$

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

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

Answer: A

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56. The locus of the point at which two given unequal circles subtend equal angles is: (A) a straight line(B) a circle (C) a parabola (D) an ellipse

A. a straihght line

B. a circle

C. a parabola

D. none of these

Answer: B

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

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

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

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

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

Answer: A

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58. The centre of family of circles cutting the family of circles

$$x^2 + y^2 + 4x\left(\lambda - \frac{3}{2}\right) + 3y\left(\lambda - \frac{4}{3}\right) - 6(\lambda + 2) = 0$$

orthogonally, lies on

A. $x - y - 1 = 0$

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

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

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

Answer: B

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Multiple Correct Answers Type

1. Line $3x + 6y = k$ intersect the curve $2x^2 + 3y^2 + 2xy = 1$ at points A and B. Thecircle on AB as diameter passes through origin,then sum of all possible values of 'k' is

A. 3

B. 4

C. -4

D. -3

Answer: A::D

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

A. CP is the arithmetic mean of AP and BP

B. PR is the geometric mean of PS and PC

C. PS is the harmonic mean of PA and PB

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

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

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

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

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

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

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

Answer: A::C

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

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

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

Which of the following is (are) true?

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

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

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

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

Answer: A::B::C

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

A. Incentre of ΔPQR is (1,0)

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

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

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

Answer: A::D

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

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

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

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

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

Answer: A::B::C

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7. A circle $S=0$ passes through the common points of family of circles $x^2+y^2+\lambda x-4y+3=0$ and $(\lambda \varepsilon R)$ has minimum area then

A. area of $S=0$ is π sq. units

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

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

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

Answer: A::B::D

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

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

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

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

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

Answer: A::D

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9. Locus of the intersection of the two straight lines passing through $(1, 0)$ and $(-1, 0)$ respectively and including an angle of 45° can be a circle with (a) centre $(1, 0)$ and radius $\sqrt{2}$ (b) centre $(1, 0)$ and radius 2 (c) centre $(0, 1)$ and radius $\sqrt{2}$ (d) centre $(0, -1)$ and radius $\sqrt{2}$

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

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

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

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

Answer: C::D

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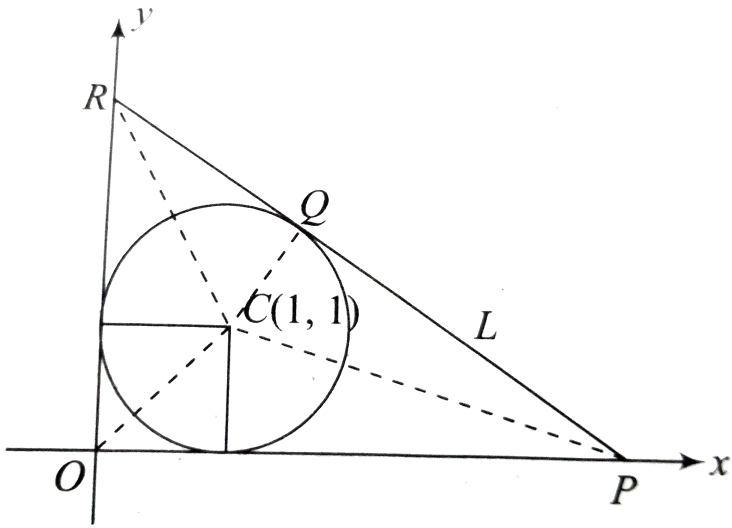
Comprehension Type

1.



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

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

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

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

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

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

Answer: D

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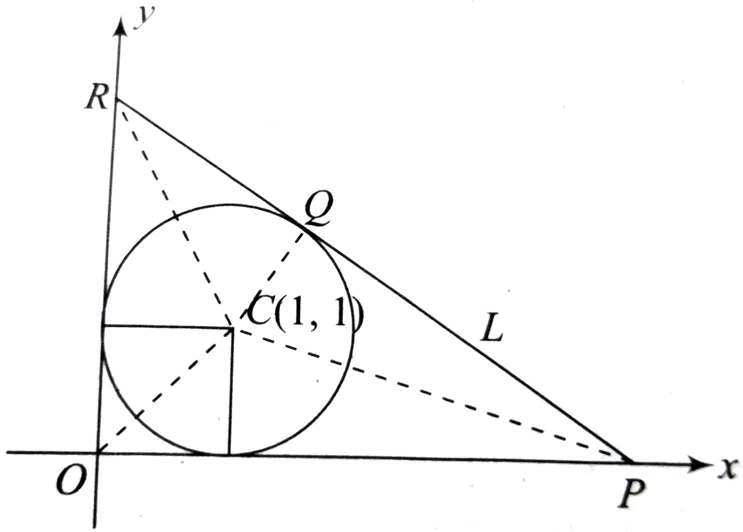

2.

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

Equation of the line PR is

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

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

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

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

Answer: C

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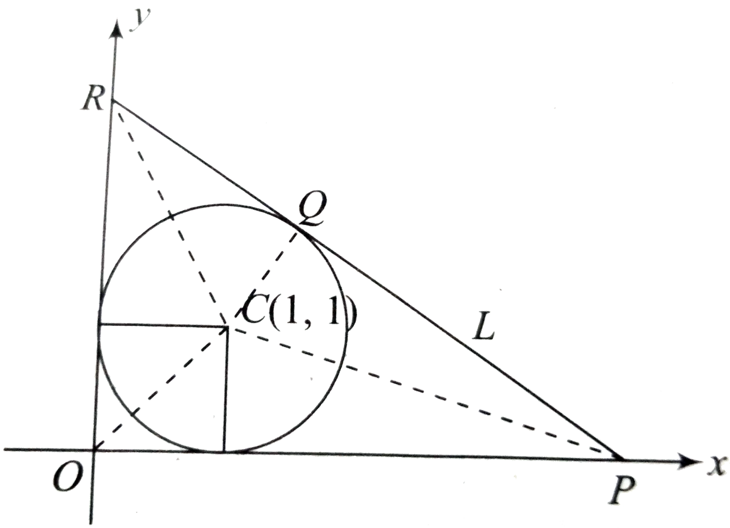

3.

In the diagram as shown, a circle is drawn with centre

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

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

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

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

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

D. none of these

Answer: B

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

Radius of one of the circles is

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

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

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

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

Answer: D

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5. P(α,β) is a point in first quadrant. If two circles which passes through point P and touches both the coordinate axis, intersect each other orthogonally, then

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

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

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

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

Answer: A

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

Equation of common chord of two circles is

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

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

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

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

Answer: C

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

Centre of these circles are at

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

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

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

D. None of these

Answer: B

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

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

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

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

D. $\pi/4$

Answer: B

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