18

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

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

3. A circle with center (2, 2) touches the coordinate axes and a straight line AB where A and B lie on positive direction of coordinate axes such that the circle lies between origin and the line AB. If O be the origin then the locus of circumcenter of ΔOAB 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) $xy + x + y + \sqrt{x^2 + y^2} = 0$

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

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

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

(a) 8 (b) $\sqrt{110}$ (c) $\sqrt{19}$ (d) None of these

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) $5\sqrt{2}$

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) $\sqrt{\frac{2}{9}}$

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 x-axis. Length PQ is equal to :

(a) $\sqrt{12}$ (b) $\sqrt{10}$ (c) 4 (d) $\sqrt{15}$

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 of C is :

(a) $(17, 12)$ (b) $(17, 5)$ (c) $(17, 16)$ (d) $(15, 3)$

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.

12. $A(1, 0)$ and $B(0, 1)$ 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) $x^2 + y^2 + 2x - 2y + 1 = 0$

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

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

(a) $12\ cm^2$
(b) $9\sqrt{3}\ cm^2$
(c) $8\sqrt{3}\ cm^2$
(d) $12\sqrt{3}\ cm^2$

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

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

17. 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:

(a) $10\sqrt{3}$
(b) $10\sqrt{5}$
(c) $10\sqrt{3} + \frac{5\pi}{3}$
(d) $10 + 5\pi$

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) $1/\sqrt{3}$
(b) 2/3
(c) 1/2
(d) 1

19. The equation of the tangent to the circle $x^2 + y^2 - 4x = 0$ which is perpendicular to the normal drawn through the origin can be :

(a) $x = 1$ (b) $x = 2$ (c) $x + y = 2$ (d) $x = 4$

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) $3x + 4y = 12$

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

(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 $x^2 + y^2 + x + y - 17 = 0$

22. The equation of the diameter of the 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) $3x + 5y = 1$

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

(a) 2 (b) 3 (c) 4 (d) 5

24. A square $OABC$ is formed by line pairs $xy = 0$ and $xy + 1 = x + y$ where 'O' is the origin. A circle with centre 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 of C_1, is drawn to touch the circle C_1 and the other line pair. The radius of the circle with centre C_1 is:

(a) $\dfrac{\sqrt{2}}{\sqrt{3}(\sqrt{2}+1)}$ (b) $\dfrac{2\sqrt{2}}{3(\sqrt{2}+1)}$

(c) $\dfrac{\sqrt{2}}{3(\sqrt{2}+1)}$ (d) $\dfrac{\sqrt{2}+1}{3\sqrt{2}}$

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) $x^2 + y^2 - 6x - 6y + 17 = 0$

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

(a) $fx + gy = 0$ (b) $gx + fy = 0$ (c) $x = 0$ (d) $y = 0$

27. The line $y = x$ is tangent at (0, 0) to a circle of radius 1. The centre 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)

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

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) $\dfrac{AB \cdot AD}{\sqrt{AB^2 + AD^2}}$ (b) $\dfrac{AB \cdot AD}{AB + AD}$

(c) $\sqrt{AB \cdot AD}$ (d) $\dfrac{AB \cdot AD}{\sqrt{AB^2 - AD^2}}$

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

(a) (3, 2) (b) (3, −2) (c) (2, −3) (d) (2, 3)

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.

32. If $x=3$ is the chord of 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) $x^2-8y^2=729$

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) $\frac{7}{5}$

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) $\cot^{-1}\frac{4}{3}$

35. The abscissae of 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 $x^2+2px-q^2=0$. The radius of the circle with AB as diameter is ::

(a) $\sqrt{a^2+b^2+p^2+q^2}$ (b) $\sqrt{a^2+p^2}$

(c) $\sqrt{b^2+q^2}$ (d) $\sqrt{a^2+b^2+p^2+1}$

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:

(a) $x_1x_2=1$ (b) $x_1x_2=-1$

(c) $x_1+x_2=1$ (d) $4x_1x_2=1$

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) $3\sqrt{2}$

38. The distance between the chords of contact of tangents to the circle $x^2+y^2+2gx+2fy+c=0$ from the origin and 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) $\frac{\sqrt{g^2+f^2+c}}{2\sqrt{g^2+f^2}}$

39. If the tangents AP 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

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

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
(d) is a circle having centre on y-axis and touching x-axis

42. A circle of radius unity is centred at origin. Two particles start moving at the same time from the point $(1, 0)$ and move around the circle in opposite direction. One of the particle moves counter clockwise 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) $(-1, 0)$

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

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

(a) 2 (b) 4 (c) $2\sqrt{2}$ (d) $\sqrt{5}$

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

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 the curve $(x^2 + y^2)^2 = \lambda a^2(x^2 + y^2 - a^2)$. The value of λ is:

(a) 2 (b) 4

(c) 8 (d) 16

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) $x^2 + y^2 - 2x - 22y + 32 = 0$

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

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

50. If $\left(a, \frac{1}{a}\right), \left(b, \frac{1}{b}\right), \left(c, \frac{1}{c}\right)$ and $\left(d, \frac{1}{d}\right)$ 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

Answers

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(b)	**5.**	(b)	**6.**	(c)	**7.**	(a)	**8.**	(d)	**9.**	(a)	**10.**	(b)
11.	(a)	**12.**	(a)	**13.**	(c)	**14.**	(d)	**15.**	(c)	**16.**	(a)	**17.**	(c)	**18.**	(a)	**19.**	(d)	**20.**	(a)
21.	(c)	**22.**	(b)	**23.**	(c)	**24.**	(c)	**25.**	(c)	**26.**	(b)	**27.**	(c)	**28.**	(d)	**29.**	(d)	**30.**	(d)
31.	(d)	**32.**	(b)	**33.**	(d)	**34.**	(c)	**35.**	(a)	**36.**	(a)	**37.**	(b)	**38.**	(c)	**39.**	(d)	**40.**	(b)
41.	(b)	**42.**	(d)	**43.**	(a)	**44.**	(b)	**45.**	(c)	**46.**	(c)	**47.**	(b)	**48.**	(a)	**49.**	(c)	**50.**	(c)