MATHEMATICS

AIM POINTS
MATHEMATICS
DIR. FIROZ AHMAD

Ramrajya More, Siwan (Bihar)

XIᵗʰ, XIIᵗʰ, TARGET IIT-JEE
(MAIN + ADVANCE) & COMPETITIVE EXAM.
FOR XI (PQRS)

THE CIRCLE
& Their Properties

CONTENTS

EXERCISE-1

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

2. Find the equation of a circle of radius 5 whose centre lies on x–axis and passes through the point (2, 3).

3. The circle $(x - a)^2 + (y - a)^2 = a^2$ is rolled on the y–axis in the positive direction through one complete revolution. Find the equation of the circle in its new–position.

4. Find the equation of the circle passing through the points (1, –2) and (4, –3) and whose centre lies on the line $3x + 4y = 7$.

5. Find the equation of the circle whose centre lies on the positie direction of y–axis at a distance 6 from the origin and whose radius is 4.

6. If the equations of two diameters of a circle are $2x + y = 6$ and $3x + 2y = 4$ and the radius is 10, find the equation of the circle.

7. The circle $x^2 + y^2 - 2x - 2y + 1 = 0$ is rolled along the positive direction of x–axis and makes one complete roll. Find its equation in new–position.

8. Find the equations of the circles touching y–axis at (0, 3) and making an intercept of 8 units on teh X–axis.

9. Prove that the equation $x^2 + y^2 + 2gx + 2fy + c = 0$ always represents a circle whose centre is $(-g, -f)$ and radius $= \sqrt{g^2 + f^2 - c}$.

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

11. Find the area of an equilateral triangle inscribed in the circle $x^2 + y^2 + 2gx + 2fy + c = 0$.

12. Find the equation of the circle passing through the points :
   (i) (5, 7), (8, 1) and (1, 3)   (ii) (1, 2), (3, –4) and (5, –6)
   (iii) (5, –8), (–2, 9) and (2, 1)   (iv) (0, 0), (–2, 1) and (–3, 2)

13. Show that the points (3, –2), (1, 0), (–1, –2) and (1, –4) are concyclic.

14. Find the equation of the circle which passes through the origin and cuts off chord of lengths 4 and 6 on the positive side of the x–axis and y–axis respectively.

15. Find the equation of the circle concentric with $x^2 + y^2 - 4x - 6y - 3 = 0$ and which touches the y–axis.

16. On the line joining (1, 0) and (3, 0) an equilateral triangle is drawn, having its vertex in the first quadrant. Find the equation ot the circles described on its sides as diameter.

17. ABCD is a square whose side is a; taking AB and AD as axes, prove that the equation of the circle circumscribing the square is $x^2 + y^2 - a(x + y) = 0$.

18. Find the equation of the circle which circumscribes the triangle formed by the lines x = 0, y = 0 and $lx + my = 1$.

EXERCISE-2

Answer each of the following questions in one word or one sentence of as per exact requirement of the questions :

1. Write the equation of the unit circle concentric with $x^2 + y^2 - 8x + 4y - 8 = 0$.

2. If the line $y = mx$ does not intersect the circle $(x + 10)^2 + (y + 10)^2 = 180$, then write the set of values taken by m.

EXERCISE-3

Mark the correct alternative in each of the following

1. If the centroid of an equilateral triangle is (1, 1) and its one vertex is (–1, 2), then equation of its circumcircle is
   (a) $x^2 + y^2 - 2x - 3 = 0$
   (b) $x^2 + y^2 + 2x - 2y - 3 = 0$
   (c) $^2 + y^2 + 2x + 2y - 3 = 0$ ·
   (d) none of these

2. If the point (λ, λ +1) lies inside the region bounded by the curve $x = \sqrt{25 - y^2}$ and y–axis, then λ belongs to the interval
   (a) (–1, 3)
   (b) –3, 4
   (c) $(-\infty, -4) \cup (3, \infty)$
   (d) $(-\infty, -2) \cup (3, \infty)$

3. If the circle $x^2 + y^2 + 2ax + 8y + 16 = 0$ touches x–axis, then the value of a is
   (a) ± 16
   (b) ± 4
   (c) ± 8
   (d) ± 1

4. The equation of the circle concentric with $x^2 + y^2 - 3x + 4y - c = 0$ and passing through (=1, –2) is
   (a) $x^2 + y^2 - 3x + 4y - 1 = 0$
   (b) $x^2 + y^2 - 3x + 4y = 0$
   (c) $x^2 + y^2 - 3x + 4y + 2 = 0$
   (d) none of these

5. If the circles $x^2 + y^2 = a$ and $x^2 + y^2 - 6x - 8y + 9 = 0$, touch externally, then a =
   (a) 1
   (b) –1
   (c) 3
   (d) 4

6. If (–3, 2) lies on the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ which is concentric with the circle $x^2 + y^2 + 6x + 8y - 5 = 0$, then c =
   (a) 11
   (b) –11
   (c) 24
   (d) none of these

7. Equation of the diameter of the $x^2 + y^2 - 2x + 4y = 0$ which passes through the origin is
   (a) $x + 2y = 0$
   (b) $x - 2y = 0$
   (c) $2x + y = 0$
   (d) $2x - y = 0$