

Chapter Four: The Circle

Creative Essay Type

1. ► Cadet 'Y' writes a circle equation $x^2 + y^2 - 2bx = 0$ and matrix $\begin{bmatrix} 3 & -4 & 2 \\ -2 & 1 & 0 \\ -1 & -1 & 1 \end{bmatrix}$ in the black board.

[Mirzapur Cadet College, Tangail]

- Find the equation of the tangent at the point $(4, -11)$ of the circle $x^2 + y^2 - 3x + 10y - 15 = 0$. 2
- Show that $px + qy = 1$ will touch the circle in the stem if $b^2q^2 + 2bp = 1$. 4
- Find the inverse matrix of the given matrix in the stem. 4

Ans: See HSC EV Higher Mathematics 1st Paper 4th Chapter Note Ques. No. 11 of Answer Paper.

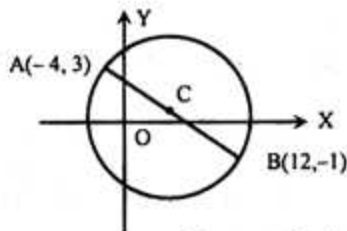
2. ► The circle $x^2 + y^2 - 4x - 6y + c = 0$ touches the x -axis.

[Joypurhat Girls' Cadet College, Joypurhat]

- Find radius and the length of the intercept which cuts off from the x -axis. 2
- Find c and the co-ordinates of the point of contact. 4
- Find the equation of the circle which is concentric with the given circle and touches the x -axis: and also find the length of the intercept it makes on the y -axis. 4

Ans: See HSC EV Higher Mathematics 1st Paper 4th Chapter Note Ques. No. 14 of Answer Paper.

3. ►



[Rangpur Cadet College, Rangpur]

In figure AB is a diameter of a circle centered in C.

- Find the equation of the tangent to the circle $x^2 + y^2 - 3x + 10y = 15$ at $(4, -11)$. 2
- Find the intercepts cut off from x -axis and y -axis by the given circle. 4
- Determine the equation of a circle passes through the point A, B and origin. 4

Ans: See HSC EV Higher Mathematics 1st Paper 4th Chapter Note Ques. No. 16 of Answer Paper.

4. ► $2x^2 + 2y^2 + 8x - 16y + 4 = 0$... (i)
 $x^2 + y^2 - 4y = 0$... (ii) *[Feni Girls' Cadet College, Feni]*

- Find the polar equation of a circle passes through the pole with centre at $(4, 45^\circ)$. 2
- The tangents of the equation (i) cut off equal intercepts of same sign from the axes of co-ordinates; find the equation of the tangents. 4
- Find the equation of the circle whose centre is at $(0, 3)$ and which passes through the points of intersection. of the circle (ii) and the straight line $y = 2$. 4

Ans: See HSC EV Higher Mathematics 1st Paper 4th Chapter Note Ques. No. 18 of Answer Paper.

5. ► A $(4, 4)$, B $(-2, 7)$ and D $(6, -8)$ are three points.

[Jhenidah Cadet College, Jhenidah]

- If ABCD is formed as parallelogram, find the co-ordinates of C. 2

- Find the equation of the angular bisectors of the angles between the straight lines AB and OD, where O is the origin. 4
- Find the equation of the circle which touches x -axis at $(4, 0)$ and passes through D. 4

Ans: See HSC EV Higher Mathematics 1st Paper 4th Chapter Note Ques. No. 21 of Answer Paper.

Creative Multiple Choice

- What is the center of circle defined by the equation $3x^2 + 3y^2 - 5x - 6y + 4 = 0$?
 (a) $(\frac{5}{3}, 1)$ (b) $(\frac{5}{8}, 1)$
 (c) $(\frac{5}{6}, 1)$ (d) $(1, 9)$ c
- Which is the radius of circle that touches y -axis and centered at $(1, -2)$?
 (a) 1 (b) 2
 (c) $\sqrt{5}$ (d) 9 d
- What is the radius of the circle centered at $(2, 3)$ touches x -axis?
 (a) 2 (b) 3 (c) $\sqrt{13}$ (d) 5 b
- Which one of the following equation represents a point circle?
 (a) $x^2 + y^2 + 4x - 8y + 20 = 0$
 (b) $x^2 + y^2 + 4x - 8y - 20 = 0$
 (c) $x^2 + 2x + y^2 = 0$
 (d) $x^2 - 2x + y^2 = 0$ a
- For which value of p , the circle $x^2 + y^2 - 4x - 8y + p = 0$ touches x -axis?
 (a) 4 (b) 5 (c) 7 (d) 11 a
- Considering the connecting line of points $(3, 2)$ and $(5, 2)$ as a diameter of a circle, which of the following is the centre of that circle?
 (a) $(-4, -2)$ (b) $(-4, 2)$
 (c) $(4, 2)$ (d) $(2, 4)$ c
- Which is the tangent to the circle $x^2 + y^2 = 20$ at the point $(2, 4)$?
 (a) $x + 2y - 10 = 0$ (b) $2x + y - 10 = 0$
 (c) $2x - y + 10 = 0$ (d) $2x - y - 10 = 0$ d
- What is the length of tangent of circle $x^2 + y^2 = 1$ at point $(2, 3)$?
 (a) $4\sqrt{3}$ (b) $2\sqrt{3}$
 (c) 3 (d) $\sqrt{3}$ b
- What is the length of the tangent line drawn from the point $(4, 2)$ on the circle $x^2 + y^2 = 2$?
 (a) $4\sqrt{3}$ (b) $3\sqrt{2}$
 (c) $2\sqrt{3}$ (d) $2\sqrt{5}$ b
- A circle passes through points $(3, 5)$ and $(4, 6)$ and centered on x -axis. Which of the following is the equation of that circle?
 (a) $x^2 + y^2 - 4y + 11 = 0$ (b) $x^2 + y^2 - 3y + 9 = 0$
 (c) $x^2 + y^2 + 5y = 0$ (d) $x^2 + y^2 - 6x - 16 = 0$ d

11. What is the equation of common chord of circles $x^2 + y^2 + 4x + 5y + 6 = 0$ and $2x^2 + 2y^2 + 4y + 6 = 0$?
 (a) $4x + 3y + 3 = 0$ (b) $4x - 3y - 3 = 0$
 (c) $3x - 4y + 3 = 0$ (d) $4x + y = 0$ **(a)**
12. What is the equation of the common chord of the circles $x^2 + y^2 + 8x - 3y + 7 = 0$ and $3x^2 + 3y^2 + 12y + 15 = 0$?
 (a) $8x - 7y + 2 = 0$ (b) $4x - 3y + 2 = 0$
 (c) $8x + 7y + 2 = 0$ (d) $7x - 8y + 2 = 0$ **(a)**
13. If $(-2, 3)$ lies on the circle $x^2 + y^2 - 8x - 10y + c = 0$ then what is the value of c ?
 (a) -1 (b) -12
 (c) 1 (d) 12 **(c)**
14. If $x^2 + y^2 + 2x - 4y + 3 = 0$ and $x^2 + y^2 - 4x + 6y + 1 = 0$ touches each other, what is the distance between the centers?
 (a) $\sqrt{34}$ (b) 9
 (c) 25 (d) 34 **(a)**
15. Which of the following is the center of circle $r = 2a \cos \theta$?
 (a) $(-a, 0)$ (b) $(a, 0)$
 (c) $(0, a)$ (d) $(0, -a)$ **(b)**
16. The line $x + y = 4$ touches the circle $x^2 + y^2 - 12x - 8y + 34 = 0$. Which is the point of contact?
 (a) $(1, 1)$ (b) $(3, 1)$
 (c) $(3, 2)$ (d) $(2, 5)$ **(b)**
17. For which condition $y = mx + c$ will touch the circle $x^2 + y^2 = a^2$?
 (a) $c = a\sqrt{1+m^2}$ (b) $c = \pm a\sqrt{1+m^2}$
 (c) $c = \sqrt{1+m^2}$ (d) $c = 1 + m^2$ **(b)**
18. The circle $r + 4\cos\theta = 0$ has —
 i. Centre at $(-2, 0)$ ii. Radius 2 units
 iii. Area of 6.28 sq. units
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(d)**
19. If the polar equation of a circle $r = a$ then —
 i. Cartesian equation is $x^2 + y^2 - a^2 = 0$
 ii. centre is $(0, 0)$
 iii. radius is a^2
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(d)**
20. The circle $x^2 + y^2 - 8x + 10y = 0$ —
 i. has centre at $(-4, 5)$
 ii. intersects 8 units from x -axis
 iii. intersects 10 units from y -axis
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(c)**
21. At point $(4, -11)$, the circle $x^2 + y^2 - 3x + 10y - 15 = 0$ has —
 i. Equation of tangent $5x - 12y = 152$
 ii. Equation of normal $12x + 5y + 7 = 0$
 iii. Length of tangent 15 units
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(d)**
22. The equation $(ax - y)^2 + 2(kx - 1)(2y + 3) = 0$ indicates an equation of circle with—
 i. $a = \pm 1$
 ii. $a = k$
 iii. $k = \pm \frac{1}{2}$
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(b)**
23. The equation of the tangent line drawn from the origin on the circle $x^2 + y^2 - 10x + 20 = 0$ is—
 i. $x + 2y = 0$
 ii. $x - 2y = 0$
 iii. $2x - y = 0$
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(a)**
24. The common chord of the circles $x^2 + y^2 + 6x + 2y + 6 = 0$ and $x^2 + y^2 + 8x + y + 10 = 0$ —
 i. has equation $2x - y + 4 = 0$
 ii. has perpendicular bisector passing through the point $(-3, -1)$
 iii. has the equation of the perpendicular bisector $x + 2y + 5 = 0$
Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **(d)**
- Answer the questions (25 & 26) on the basis of the following information:**
 The circle $x^2 + y^2 - 4x - 6y + c = 0$ touches x -axis.
 25. What is the value of c ?
 (a) 2 (b) 3
 (c) 4 (d) 16 **(c)**
26. Which is the coordinate of contact point?
 (a) $(2, 0)$ (b) $(0, 2)$
 (c) $(5.236, 0)$ (d) $(0.76, 0)$ **(a)**
- Answer the questions (27 & 28) based on the following information:**
 A circle with centre $(2, 3)$ touches the x -axis.
 27. What is the equation of that circle?
 (a) $x^2 + y^2 - 4x - 6y + 9 = 0$
 (b) $x^2 + y^2 - 4x - 6y + 4 = 0$
 (c) $x^2 + y^2 - 6x - 4y + 4 = 0$
 (d) $x^2 + y^2 + 4x + 6y + 4 = 0$ **(b)**
28. What is the intercept of y -axis by the circle?
 (a) $\frac{\sqrt{5}}{2}$ (b) $\sqrt{5}$
 (c) $2\sqrt{5}$ (d) 5 **(c)**

Answer the questions (29 & 30) based on the following information:

The point $A(1, 1)$ lies on the circle $x^2 + y^2 + 4x + 6y - 12 = 0$.

29. Which of the following indicates the centre of that circle?

- (a) $(-2, -3)$ (b) $(2, 3)$
 (c) $(-2, 3)$ (d) $(4, 6)$

30. What is the coordinate of other side of the diameter drawn from the point A ?

- (a) $(5, 7)$ (b) $(-5, 7)$
 (c) $(5, -7)$ (d) $(-5, -7)$

Answer the questions (31 & 32) based on the following information:

A polar equation of a circle $r = a \cos \theta$.

31. What is the Cartesian equation of the circle?

- (a) $x^2 + y^2 - ax = 0$ (b) $x^2 + y^2 + ax = 0$
 (c) $x^2 + y^2 + 2x = 0$ (d) $x^2 + y^2 - 2x = 0$

32. What is the radius of the circle?

- (a) $\frac{a}{2}$ (b) a
 (c) $2a$ (d) $4a$

Answer the questions (33 & 34) on the basis of the following information:

The line $ax + 2y - 1 = 0$ touches the circle $x^2 + y^2 - 8x - 2y + 4 = 0$.

33. What is the distance between the centre and line?

- (a) 3 (b) $\sqrt{13}$
 (c) 13 (d) 169

34. What is the value for a ?

- (a) $3, \frac{-17}{3}$ (b) $3, -1$
 (c) $2, -6$ (d) $-3, \frac{17}{3}$

35. What is the equation of circle that touches y -axis at point $(0, 4)$ and the centre on the line $5x - 7y - 2 = 0$?

[DU 16-17]

- (a) $x^2 + y^2 + 12x - 8y + 16 = 0$
 (b) $x^2 + y^2 - 8x - 6y + 8 = 0$
 (c) $x^2 + y^2 - 12x - 8y + 16 = 0$
 (d) $x^2 + y^2 + 8x + 6y - 40 = 0$

36. What is the area (sq. unit) of the region bounded by the circle $x^2 + y^2 - gx = 0$?

[DU 16-17]

- (a) $\frac{1}{8} \pi g^2$ (b) $\frac{1}{4} \pi g^2$
 (c) $\frac{1}{2} \pi g^2$ (d) πg^2

37. What is the condition for the line $y = mx + c$ to touch the circle $x^2 + y^2 = 25$?

[DU 16-17]

- (a) $c = -25\sqrt{1+m^2}$ (b) $c = 25\sqrt{1+m^2}$
 (c) $c = \pm 5\sqrt{1+m^2}$ (d) $c = \pm r\sqrt{1+m^2}$

38. If the line segment joining the points $(-4, 3)$ and $(12, -$

1) is taking as diameter of a circle then what is the equation of the circle? [DU. 15-16]

- (a) $x^2 + y^2 + 8x - 2y + 51 = 0$
 (b) $x^2 + y^2 - 8x - 2y + 51 = 0$
 (c) $x^2 + y^2 + 8x + 2y - 51 = 0$
 (d) $x^2 + y^2 - 8x - 2y - 51 = 0$

39. What is the touching point of circles $(x - 2)^2 + (y - 3)^2 = 16$ and $(x - 2)^2 + (y - 10)^2 = 9$.

- (a) $(2, 3)$ (b) $(16, 9)$
 (c) $(2, 10)$ (d) $(2, 7)$

40. Which circle of the following touches the x -axis?

[DU. 14-15]

- (a) $x^2 + y^2 - 2x + 6y + 4 = 0$
 (b) $x^2 + y^2 - 4x + 6y + 5 = 0$
 (c) $x^2 + y^2 - 2x + 6y + 1 = 0$
 (d) $2x^2 + 2y^2 - 2x + 6y + 3 = 0$

41. What is the equation of circle which is passing through the point $(3, -1)$ and concentric with the circle $x^2 + y^2 - 6x + 8y = 0$?

- [DU. 13-14]
 (a) $x^2 + y^2 + 6x - 8y + 16 = 0$
 (b) $x^2 + y^2 - 6x - 8y - 16 = 0$
 (c) $x^2 + y^2 - 6x + 8y + 16 = 0$
 (d) $x^2 + y^2 - 6x - 8y + 16 = 0$

42. A circle passes through the points $(-1, -1)$ & $(3, 2)$ and the centre lies on the line $x + 2y + 3 = 0$. The equation of circle—

- [DU. 10-11]
 (a) $x^2 + y^2 - 4x + 5y - 15 = 0$
 (b) $x^2 + y^2 - 8x + 7y - 3 = 0$
 (c) $x^2 + y^2 + 8x - 7y + 3 = 0$
 (d) $x^2 + y^2 + 4x - 5y + 15 = 0$

43. Find the value of k if the line $3x + ky - 1 = 0$ touches the circle $x^2 + y^2 - 8x - 2y + 4 = 0$.

[DU. 10-11]

- (a) $2, \frac{1}{6}$ (b) $-2, \frac{1}{6}$
 (c) $2, -\frac{1}{6}$ (d) $-2, -\frac{1}{6}$

44. If the circles $x^2 + y^2 + 2x + c = 0$ and $x^2 + y^2 + 2y + c = 0$ touch each other then what is the value of c ?

- [BUET. 12-13]
 (a) 0 (b) $\frac{1}{2}$
 (c) 1 (d) 2

45. If the equations of two parallel tangents of a circle are $2x - 4y - 9 = 0$ and $6x - 12y + 7 = 0$ then what is the radius?

- [BUET. 12-13]
 (a) $\frac{\sqrt{3}}{5}$ (b) $\frac{17}{3\sqrt{5}}$
 (c) $\frac{17}{5\sqrt{3}}$ (d) $\frac{17}{6\sqrt{5}}$

46. Under what condition the line $x + y = 1$ will touch the circle $x^2 + y^2 - 2ax = 0$?

- [BUET A.T.(11-12)]
 (a) $a^2 - 2a = 1$ (b) $a^2 + 2a = -1$
 (c) $a^2 + 2a = 1$ (d) $a^2 - 2a = -1$

47. Find the length of the intercept on the x -axis by the circle drawn on the line segment joining the points $(0, -1)$ and $(2, 3)$ as a diameter. [BUET. 10-11]
 (a) 2 (b) 3 (c) 4 (d) $3\sqrt{2}$ (d)
48. The centre of a circle passing through origin is $(4, 3)$. Which of the following point is not on the circle? [BUET. 07-08]
 (a) $(-1, 3)$ (b) $(9, 3)$ (c) $(0, 3)$ (d) $(8, 0)$ (c)
49. The common chord of the circles $x^2 + y^2 - 4x - 8y - 5 = 0$ and $x^2 + y^2 - 6x + 14y - 8 = 0$ distant from the centre of larger circle is - [KUET 13-14]
 (a) $\frac{187}{\sqrt{584}}$ (b) $\frac{163}{\sqrt{584}}$ (c) $\frac{187}{\sqrt{488}}$ (d) $\frac{163}{\sqrt{488}}$ (d)
50. The equation of perpendicular on the joining line of centres of the circles $x^2 + y^2 - 8x - 6y = 0$ and $x^2 + y^2 + 32x + 24y = 0$ which is passing through the point of intersection of the circles—[KUET. 12-13]
 (a) $6x - y = 0$ (b) $4x + 3y = 0$ (c) $3x - 4y = 0$ (d) $4x - 3y = 0$ (b)
51. What is the equation of circle whose area is 154 sq. unit and two equations of diameter are $2x - 3y = 5$ and $3x - 4y = 7$? [RUET. 10-11. KUET. 08-09]
 (a) $x^2 + y^2 + 2x - 2y = 62$ (b) $x^2 + y^2 + 2x - 2y = 51$ (c) $x^2 + y^2 - 2x + 2y = 47$ (d) $x^2 + y^2 - 2x + 2y = 62$ (c)
52. For which value of k , the equation $(x - y + 3)^2 + (kx + 2)(y - 1) = 0$ defines as a circle? [CUET A.T. (11-12)]
 (a) -2 (b) -1 (c) 1 (d) 2 (d)
53. The circle $x^2 + y^2 = 16$ intersects x -axis and y -axis at the point A and B respectively. If the perpendicular distance of AB from the centre of the circle represents the side of a square then what is the area of the square? [CUET. 11-12]
 (a) 4 sq. unit (b) 6 sq. unit (c) 8 sq. unit (d) 10 sq. unit (c)
54. For which value of k the circle $x^2 + y^2 + kx + 2y + 25 = 0$ touches the x -axis? [CUET. 10-11]
 (a) 5 (b) ± 5 (c) 10 (d) ± 10 (d)
55. If OA and OB are the tangents from origin of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ and C is the centre then what is the area of the quadrilateral OABC? [RUET. 10-11]
 (a) $\frac{1}{2}\sqrt{g^2 + f^2 - c}$ (b) $\sqrt{c(g^2 + f^2 - c)}$ (c) $\frac{1}{4}\sqrt{g^2 + f^2 - c}$ (d) $\sqrt{g^2 + f^2 - c} \cdot \sqrt{g^2 + f^2}$ (b)
56. What is the intercept on the x -axis by a circle of general equation? [BUTEX. 12-13]
 (a) $2\sqrt{g^2 + c}$ (b) $2\sqrt{f^2 + c}$ (c) $2\sqrt{g^2 - c}$ (d) $2\sqrt{f^2 - c}$ (c)
57. What is the length of perpendicular drawn from $(1, 1)$ on the circle $x^2 + y^2 + 2(x + y) = 0$ [BUTEX. 11-12]
 (a) $\sqrt{3}$ (b) $\sqrt{5}$ (c) $\sqrt{6}$ (d) $\sqrt{7}$ (c)
58. What is the length of the tangent line drawn from the point $(1, -1)$ on the circle $2x^2 + 2y^2 - x + 3y + 1 = 0$? [KU A.T. (14-15)]
 (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\sqrt{2}$ (d) 2 (b)
59. Which of the following is an equation of a circle which touches x -axis and centred at $(2, 4)$? [DU(11-12)]
 (a) $x^2 + y^2 - 4x + 5y - 15 = 0$ (b) $x^2 + y^2 - 4x - 8y + 4 = 0$ (c) $x^2 + y^2 + 8x - 7y + 3 = 0$ (d) $x^2 + y^2 + 4x - 5y + 15 = 0$ (b)
60. What will be the equation of the circle if it touches each axis at 4 units away from origin in the positive direction? [ChU.A.T. (14-15)]
 (a) $x^2 + y^2 = 16$ (b) $x^2 + y^2 + 8x + 8y = 48$ (c) $x^2 + y^2 + 8x + 8y - 16 = 0$ (d) $x^2 + y^2 - 8x - 8y + 16 = 0$ (d)
61. If the line $lx + my = 1$ touches the circle $x^2 + y^2 - 2px = 0$ then $p^2m^2 + 2pl =$ what? [ChU (11-12)]
 (a) p^2 (b) lm (c) l^2m^2 (d) 1 (d)
62. What is the area of the circle having equation of $x^2 + y^2 - 8x + 6y + 16 = 0$? [CU. (14-15)]
 (a) 9.43 (b) 9π (c) 16π (d) 25π (b)