Entry Test MCQs: Conic Sections - Exercise 6.1 (Chapter 6, Mathematics Part-II, Class 12)

These 20 multiple-choice questions are designed for an entry test, focusing on circles from Exercise 6.1, Chapter 6: Conic Sections. They test conceptual understanding of circle equations, centers, radii, tangents, and circle relationships, with distractors reflecting common errors.

MCQs: Conic Sections - Circles

1. What is the radius of the circle $x^2 + y^2 - 6x + 4y + 13 = 0$?

(a) $\sqrt{13}$

(b) 0

(c) 4

(d) $\sqrt{9}$

Answer: b) 0 ($g = -3$, $f = 2$, $c = 13$, radius $= \sqrt{9 + 4 - 13} = 0$, point circle).

2. A circle has center $(5, -2)$ and radius 4. What is its equation in general form?

(a) $x^2 + y^2 - 10x + 4y + 13 = 0$

(b) $x^2 + y^2 + 10x - 4y + 13 = 0$

(c) $x^2 + y^2 - 10x + 4y + 25 = 0$

(d) $x^2 + y^2 + 10x - 4y - 13 = 0$

Answer: a) $(x - 5)^2 + (y + 2)^2 = 16 \Rightarrow x^2 + y^2 - 10x + 4y + 13 = 0$.

3. The equation of a circle with diameter endpoints $(-3, 2)$ and $(5, -6)$ is:

(a) $x^2 + y^2 - 2x + 4y - 27 = 0$

(b) $x^2 + y^2 + 2x - 4y - 27 = 0$

(c) $x^2 + y^2 - 2x + 4y + 27 = 0$

(d) $x^2 + y^2 - 2x - 4y - 27 = 0$

Answer: a) Center $= (1, -2)$, radius $= \sqrt{32}$, equation: $(x - 1)^2 + (y + 2)^2 = 32$.

4. If a circle passes through $(4, 5)$, $(-4, -3)$, and $(8, -3)$, what is the coefficient of x in its general form equation?

(a) -4

(b) 4

(c) -8

(d) 8

Answer: a) Equation: $x^2 + y^2 - 4x + 2y - 25 = 0$, coefficient of x: -4.

5. The center of the circle $5x^2 + 5y^2 + 14x + 12y - 10 = 0$ lies in which quadrant?

(a) First

(b) Second

(c) Third

(d) Fourth

Answer: c) Divide by 5: $x^2 + y^2 + \frac{14}{5}x + \frac{12}{5}y - 2 = 0$, center: $\left(-\frac{7}{5}, -\frac{6}{5}\right)$, third quadrant.

6. A circle is tangent to both axes in the second quadrant with radius a. What is its center?

(a) (a, a)

(b) $(-a, a)$

(c) $(-a, -a)$

(d) $(a, -a)$

Answer: b) Tangent to x-axis at $(-a, 0)$, y-axis at $(0, a)$, center: $(-a, a)$.

7. The distance between the centers of circles $x^2+y^2+2x-2y-7 = 0$ and $x^2+y^2-6x+4y+9 = 0$ is:

(a) 5

(b) 3

(c) $\sqrt{13}$

(d) 7

Answer: a) Centers: $(-1, 1)$, $(3, -2)$, distance: $\sqrt{(3+1)^2 + (-2-1)^2} = 5$.

8. Two circles touch externally if:

(a) Distance between centers equals the difference of their radii.

(b) Distance between centers equals the sum of their radii.

(c) Distance between centers is less than the sum of their radii.

(d) Distance between centers is greater than the sum of their radii.

Answer: b) External touching: $|C_1C_2| = r_1 + r_2$.

9. For a circle tangent to $x - y - 4 = 0$ at $(1, -3)$ with radius 2, what is one possible center?

(a) $(1 + \sqrt{2}, -3 - \sqrt{2})$

(b) $(1 - \sqrt{2}, -3 - \sqrt{2})$

(c) $(1, -3)$

(d) $(3, -1)$

Answer: a) Solve: $(1-h)^2+(-3-k)^2=4$, perpendicular to line slope 1, gives $h=1\pm\sqrt{2}$, $k=-3\mp\sqrt{2}$.

10. The circle passing through $(a,0)$, $(0,b)$, and $(0,0)$ has the equation:

(a) $x^2+y^2-ax-by=0$

(b) $x^2+y^2+ax+by=0$

(c) $x^2+y^2-ax+by=0$

(d) $x^2+y^2+ax-by=0$

Answer: a) Solve: $c=0$, $g=-\frac{a}{2}$, $f=-\frac{b}{2}$, equation: $x^2+y^2-ax-by=0$.

11. If a circle's center lies on $4x-3y-3=0$ and passes through $(3,-1)$, $(0,1)$, what is the coefficient of y?

(a) -18

(b) 18

(c) -9

(d) 9

Answer: a) Equation: $x^2+y^2-15x-18y+17=0$, coefficient of y: -18.

12. The line $3x-2y=0$ is tangent to the circle $x^2+y^2+6x-4y=0$ because:

(a) Distance from center to line equals the radius.

(b) Distance from center to line is zero.

(c) Line passes through the center.

(d) Radius is perpendicular to the line.

Answer: a) Center: $(-3,2)$, radius: $\sqrt{13}$, distance: $\frac{|3(-3)-2(2)|}{\sqrt{13}}=\sqrt{13}$.

13. What is the radius of the circle $4x^2+4y^2-8x+12y-25=0$?

(a) $\sqrt{38}$

(b) $\frac{\sqrt{38}}{2}$

(c) $\sqrt{25}$

(d) $\frac{\sqrt{25}}{2}$

Answer: b) Divide by 4: $x^2+y^2-2x+3y-\frac{25}{4}=0$, radius: $\sqrt{1+\frac{9}{4}+\frac{25}{4}}=\frac{\sqrt{38}}{2}$.

14. The circle passing through $(5,6)$, $(-3,2)$, $(3,-4)$ has center at:

(a) $\left(\frac{7}{3},\frac{4}{3}\right)$

(b) $\left(-\frac{7}{3},-\frac{4}{3}\right)$

(c) $\left(\frac{7}{3},-\frac{4}{3}\right)$

(d) $\left(-\frac{7}{3},\frac{4}{3}\right)$

Answer: c) Solve: $g=-\frac{7}{3}$, $f=-\frac{4}{3}$, center: $\left(\frac{7}{3},-\frac{4}{3}\right)$.

15. A circle with radius 2 and center on $2x-3y+3=0$ passing through $(-3,1)$ has how many possible equations?

(a) 1

(b) 2

(c) 3

(d) 0

Answer: b) Quadratic in k: $13k^2+10k-3=0$, yields two solutions.

16. The parametric equations $x=3\cos\theta$, $y=3\sin\theta$ represent a circle with:

(a) Center $(0,0)$, radius 3

(b) Center $(3,3)$, radius 3

(c) Center $(0,0)$, radius 9

(d) Center $(3,0)$, radius 3

Answer: a) Standard parametric form: center $(0,0)$, radius 3.

17. If a circle is tangent to $x+3y-3=0$ at $(1,4)$, and passes through $(-1,8)$, what is one possible radius?

(a) $\sqrt{10}$

(b) $\sqrt{250}$

(c) 10

(d) 5

Answer: a) Solve: $r^2=10$ or $r^2=250$, so $r=\sqrt{10}$.

18. The circles $x^2+y^2+2x-8=0$ and $x^2+y^2-6x+6y-46=0$ touch internally because:

(a) Distance between centers equals sum of radii.

(b) Distance between centers equals difference of radii.

(c) Distance between centers is zero.

(d) Radii are equal.

Answer: b) Distance: 5, radii: 3, 8; $8-3=5$.

19. If the circle $x^2+y^2-2\sqrt{2}x+6\sqrt{3}y+21=0$ has center $(\sqrt{2},-3\sqrt{3})$, what is its radius?

(a) $2\sqrt{2}$

(b) $\sqrt{2}$

(c) 4

(d) 2

Answer: a) Radius: $\sqrt{(\sqrt{2})^2+(-3\sqrt{3})^2-21}=2\sqrt{2}$.

20. The condition for a line to be tangent to a circle is:

(a) Distance from center to line equals the radius.

(b) Line intersects the circle at two points.

(c) Line passes through the center.

(d) Distance from center to line is greater than the radius.

Answer: a) Tangent touches at one point, distance equals radius.