

**CBSE Test Paper 02**  
**CH-11 Conic Sections**

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1. The angle between the tangents drawn from the origin to the circle =  
 $(x - 7)^2 + (y + 1)^2 = 25$  is
  - a.  $\frac{\pi}{3}$
  - b.  $\frac{\pi}{2}$
  - c.  $\frac{\pi}{6}$
  - d.  $\frac{\pi}{8}$
2. The number of points on X-axis which are at a distance c units ( $c < 3$ ) from ( 2, 3) is
  - a. 2
  - b. 0
  - c. 1
  - d. 3
3. The equations  $x = a \cos \theta$  ,  $y = b \sin \theta$  ,  $0 \leq \theta < 2\pi$  ,  $a \neq b$ , represent
  - a. a parabola
  - b. an ellipse
  - c. a hyperbola
  - d. a circle
4.  $x = \frac{e^t + e^{-t}}{2}$  ,  $y = \frac{e^t - e^{-t}}{2}$  ;  $t \in R$  represents
  - a. a circle
  - b. an ellipse
  - c. a parabola
  - d. a hyperbola
5. Two perpendicular tangents to the circle  $x^2 + y^2 = r^2$  meet at P. The locus of P is
  - a.  $x + y = r$
  - b.  $x^2 + y^2 = 4 r^2$
  - c.  $x^2 + y^2 = \frac{r^2}{2}$
  - d.  $x^2 + y^2 = 2 r^2$
6. Fill in the blanks:

The equation of the ellipse having foci (0, 1), (0, -1) and minor axis of length 1 is

\_\_\_\_\_.

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7. Fill in the blanks:

The equation of the parabola whose focus is the point (2, 3) and directrix is the line  $x - 4y + 3 = 0$  is \_\_\_\_\_.

8. Find the equation of the parabola with vertex at (0, 0) and focus at (0, 2).

9. Find the centre and radius of each of the following circle.  $x^2 + (y + 2)^2 = 9$

10. Find the equation of the hyperbola whose directrix is  $2x + y - 1$ , focus (1, 2) and eccentricity  $\sqrt{3}$ .

11. Find the equation of a circle of radius 5 units, passing through the origin and having its centre on the Y-axis.

12. Find the centre and radius of the circle.  $x^2 + y^2 + 6x - 4y + 4 = 0$

13. Find the equation of the hyperbola, the length of whose latus rectum is 8 and eccentricity is  $\frac{3}{\sqrt{5}}$ .

14. Find the equation of the circle passing through the points (4, 1) and (6, 5) and whose centre is on the line  $4x + y = 16$ .

15. Find the axes, eccentricity, latus-rectum and the coordinates of the foci of the hyperbola

$$25x^2 - 36y^2 = 225.$$

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**Solution**

1. (b)  $\frac{\pi}{2}$  **Explanation:** The angle between the Radius and tangent is  $90^\circ$

2. (b) 0

**Explanation:** the shortest distance from x-axis to the point is 3.

3. (b) an ellipse

**Explanation:** parametric form of ellipse.

4. (d) a hyperbola

**Explanation:**  $x = \frac{e^t + e^{-t}}{2}, y = \frac{e^t - e^{-t}}{2}; t \in R$  Squaring both sides of both the equation, we get  $x^2 = \frac{(e^t + e^{-t})^2}{4}$  and  $y^2 = \frac{(e^t - e^{-t})^2}{4}$  Subtracting one equation from another we get  $x^2 - y^2 = 1$  which is nothing but equation of hyperbola

5. (d)  $x^2 + y^2 = 2r^2$  **Explanation:** locus of P is a circle with centre at origin and radius  $\sqrt{2r^2}$ . This is known as the director circle of the circle  $x^2 + y^2 = r^2$

6.  $\frac{4x^2}{1} + \frac{4y^2}{5} = 1$

7.  $16x^2 + y^2 + 8xy - 74x - 78y + 212 = 0$

8. Given, the vertex is (0, 0) and focus is at (0, 2) which lies on Y-axis.

The Y axis is the axis of parabola.

Therefore, equation of parabola is of the form

$$x^2 = 4ay$$

$$x^2 = 4(2)y \text{ i.e., } x^2 = 8y$$

9. Given equation of circle is  $x^2 + (y + 2)^2 = 9$

$$\Rightarrow (x - 0)^2 + \{y - (-2)\}^2 = 3^2$$

On comparing with  $(x - h)^2 + (y - k)^2 = r^2$ , we get

$$h = 0, k = -2 \text{ and } r = 3$$

Hence, centre of circle = (0, -2) and radius = 3.

10. Let S (1, 2) be the focus and P (x, y) be a point on the hyperbola. Draw PM perpendicular from P on the directrix. Then,

SP = ePM [By definition]

$$\Rightarrow \sqrt{(x-1)^2 + (y-2)^2} = \sqrt{3} \left| \frac{2x+y-1}{\sqrt{2^2+1^2}} \right|$$

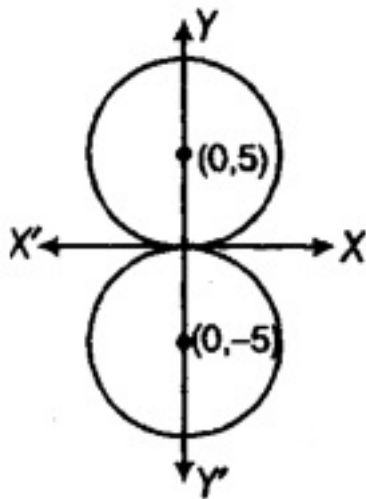
$$\Rightarrow (x-1)^2 + (y-2)^2 = \frac{3(2x+y-1)^2}{5}$$

$$\Rightarrow 5[(x-1)^2 + (y-2)^2] = 3(2x+y-1)^2$$

$$\Rightarrow 5x^2 + 5y^2 - 10x - 20y + 25 = 3(4x^2 + y^2 + 1 + 4xy - 4x - 2y)$$

$$\Rightarrow 7x^2 - 2y^2 + 12xy - 2x + 14y - 22 = 0, \text{ which is the required equation of the hyperbola.}$$

11. Radius of circle = 5. The circle passes through the origin and its centre is on the Y-axis i.e., (0, 5) and (0, -5). Equations of circle are



$$(x-0)^2 + (y-5)^2 = 5^2$$

$$\Rightarrow x^2 + y^2 - 10y + 25 = 25$$

$$\Rightarrow x^2 + y^2 - 10y = 0$$

$$\text{and } (x-0)^2 + (y+5)^2 = 5^2$$

$$\Rightarrow x^2 + y^2 + 10y + 25 = 25$$

$$\Rightarrow x^2 + y^2 + 10y = 0$$

12. Given equation of circle is  $x^2 + y^2 + 6x - 4y + 4 = 0$

$$\Rightarrow (x^2 + 6x) + (y^2 - 4y) = -4$$

$$\Rightarrow (x^2 + 6x + 9 - 9) + (y^2 - 4y + 4 - 4) = -4$$

$$\Rightarrow (x^2 + 6x + 9) + (y^2 - 4y + 4) = -4 + 4 + 9$$

$$\Rightarrow (x+3)^2 + (y-2)^2 = 9$$

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

On comparing with  $(x - h)^2 + (y - k)^2 = r^2$ , we get

$$h = -3, k = 2 \text{ and } r = 3$$

Hence, centre of circle =  $(-3, 2)$  and radius = 3.

13. Let equation of the hyperbola is  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

$$\text{Now } \frac{2b^2}{a} = 8 \Rightarrow b^2 = 4a$$

$$\text{But } b^2 = a^2(e^2 - 1)$$

$$\therefore a^2(e^2 - 1) = 4a \Rightarrow a(e^2 - 1) = 4 \Rightarrow a\left(\frac{a}{5} - 1\right) = 4 \Rightarrow a = 5$$

$$\therefore b^2 = 4 \times 5 = 20$$

Thus equation of required hyperbola is  $\frac{x^2}{25} - \frac{y^2}{20} = 1$

14. The equation of the circle is

$$(x - h)^2 + (y - k)^2 = r^2 \dots (i)$$

Since the circle passes through point  $(4, 1)$

$$\therefore (4 - h)^2 + (1 - k)^2 = r^2 \Rightarrow 16 + h^2 - 8h + 1 + k^2 - 2k = r^2$$

$$\Rightarrow h^2 + k^2 - 8h - 2k + 17 = r^2 \dots (ii)$$

Also the circle passes through point  $(6, 5)$

$$\therefore (6 - h)^2 + (5 - k)^2 = r^2 \Rightarrow 36 + h^2 - 12h + 25 + k^2 - 10k = r^2$$

$$\Rightarrow h^2 + k^2 - 12h - 10k + 61 = r^2$$

From (ii) and (iii), we have

$$h^2 + k^2 - 8h - 2k + 17 = h^2 + k^2 - 12h - 10k + 61$$

$$\Rightarrow 4h + 8k = 44 \Rightarrow h + 2k = 11 \dots (iv)$$

Since the centre  $(h, k)$  of the circle lies on the line  $4x + y = 16$

$$\therefore 4h + k = 16 \dots (v)$$

Solving (iv) and (v), we have

$$h = 3 \text{ and } k = 4$$

Putting value of  $h$  and  $k$  in (ii), we have

$$(3)^2 + (4)^2 - 8 \times 3 - 2 \times 4 + 17 = r^2$$

$$r^2 = 10$$

Thus equation of required circle is

$$(x - 3)^2 + (y - 4)^2 = 10 \Rightarrow x^2 + 9 - 6x + y^2 + 16 - 8y = 10$$

$$\Rightarrow x^2 + y^2 - 6x - 8y + 15 = 0$$

15. We have,

$$25x^2 - 36y^2 = 225$$

$$\Rightarrow \frac{25x^2}{225} - \frac{36y^2}{225} = 1$$

$$\Rightarrow \frac{x^2}{9} - \frac{4y^2}{25} = 1$$

$$\Rightarrow \frac{x^2}{9} - \frac{y^2}{\frac{25}{4}} = 1$$

$$\Rightarrow \frac{x^2}{(3)^2} - \frac{y^2}{\left(\frac{5}{2}\right)^2} = 1$$

This is of the form  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , where  $a = 3$  and  $b = \frac{5}{2}$

The length of the transverse axis =  $2a$

$$= 2 \times 3 = 6$$

The length of the conjugate axis is  $2b = 2 \times \frac{5}{2} = 5$

The eccentricity  $e$  is given by,

$$e = \sqrt{1 + \frac{b^2}{a^2}}$$

$$= \sqrt{1 + \frac{\frac{25}{4}}{9}}$$

$$= \sqrt{1 + \frac{25}{36}}$$

$$= \sqrt{\frac{61}{36}}$$

$$= \frac{\sqrt{61}}{6}$$

$$\text{Length of Latusrectum} = \frac{2b^2}{a} = \frac{25}{6}$$

$$\text{and Foci } \left(\pm \frac{\sqrt{61}}{2}, 0\right)$$