

MATHEMATICS • CLASS 11

CHAPTER 10

Conic Sections

NCERT SOLUTIONS



EXERCISE 10.1 — QUESTIONS 1–3

Q1. Find the equation of the circle with centre $(0, 2)$ and radius 2.

Solution:

The equation of a circle with centre (h, k) and radius r is

$$(x-h)^2 + (y-k)^2 = r^2.$$

Here, centre $(0, 2) \Rightarrow h=0, k=2$ and radius $r=2$.

Substituting, we get

$$\begin{aligned}(x-0)^2 + (y-2)^2 &= 2^2 \\ x^2 + (y-2)^2 &= 4.\end{aligned}$$

Q2. Find the equation of the circle with centre $(-2, 3)$ and radius 4.

Solution:

The equation of a circle with centre (h, k) and radius r is

$$(x-h)^2 + (y-k)^2 = r^2.$$

Here, centre $(-2, 3) \Rightarrow h=-2, k=3$ and radius $r=4$.

Substituting, we get

$$\begin{aligned}(x-(-2))^2 + (y-3)^2 &= 4^2 \\ (x+2)^2 + (y-3)^2 &= 16.\end{aligned}$$

Q3. Find the equation of the circle with centre $(\frac{1}{2}, \frac{1}{4})$ and radius $\frac{1}{12}$.

Solution:

The equation of a circle with centre (h, k) and radius r is

$$(x-h)^2 + (y-k)^2 = r^2.$$

Here, centre $(\frac{1}{2}, \frac{1}{4}) \Rightarrow h=\frac{1}{2}, k=\frac{1}{4}$ and radius $r=\frac{1}{12}$.

Substituting, we get

$$\begin{aligned}\left(x-\frac{1}{2}\right)^2 + \left(y-\frac{1}{4}\right)^2 &= \left(\frac{1}{12}\right)^2 \\ \left(x-\frac{1}{2}\right)^2 + \left(y-\frac{1}{4}\right)^2 &= \frac{1}{144}.\end{aligned}$$

EXERCISE 10.1 – QUESTIONS 4–5

Q4. Find the equation of the circle with centre $(1, 1)$ and radius $\sqrt{2}$.

Solution:

The equation of a circle with centre (h, k) and radius r is

$$(x - h)^2 + (y - k)^2 = r^2.$$

Here, $h = 1$, $k = 1$ and $r = \sqrt{2}$.

Substituting, we get

$$\begin{aligned}(x - 1)^2 + (y - 1)^2 &= (\sqrt{2})^2 \\ &= 2.\end{aligned}$$

Therefore, the required equation of the circle is

$$(x - 1)^2 + (y - 1)^2 = 2.$$

Q5. Find the equation of the circle with centre $(-a, -b)$ and radius $\sqrt{a^2 - b^2}$.

Solution:

The equation of a circle with centre (h, k) and radius r is

$$(x - h)^2 + (y - k)^2 = r^2.$$

Here, $h = -a$, $k = -b$ and $r = \sqrt{a^2 - b^2}$.

Substituting, we get

$$\begin{aligned}(x - (-a))^2 + (y - (-b))^2 &= (\sqrt{a^2 - b^2})^2 \\ (x + a)^2 + (y + b)^2 &= a^2 - b^2.\end{aligned}$$

For a real radius, we must have $a^2 - b^2 \geq 0$, i.e. $a^2 \geq b^2$.

Thus, the required equation of the circle is

$$(x + a)^2 + (y + b)^2 = a^2 - b^2. \quad (a^2 \geq b^2)$$

EXERCISE 10.1 – QUESTIONS 6–7

Question 6:

$$(x + 5)^2 + (y - 3)^2 = 36$$

This is in the standard form $(x - h)^2 + (y - k)^2 = r^2$.

Comparing, we get $h = -5$, $k = 3$ and $r^2 = 36$.

Centre = $(-5, 3)$

Radius = 6

Question 7:

$$x^2 + y^2 - 4x - 8y - 45 = 0$$

Completing the squares, we get

$$x^2 - 4x + y^2 - 8y = 45$$

$$(x^2 - 4x + 4) + (y^2 - 8y + 16) = 45 + 4 + 16$$

$$(x - 2)^2 + (y - 4)^2 = 65$$

Thus the centre is $(2, 4)$ and the radius is $\sqrt{65}$.

Centre = $(2, 4)$

Radius = $\sqrt{65}$

EXERCISE 10.1 — QUESTIONS 8–9

Q8. $x^2 + y^2 - 8x + 10y - 12 = 0$

Complete the squares for x and y .

$$x^2 - 8x + y^2 + 10y = 12$$

$$(x^2 - 8x + 16) + (y^2 + 10y + 25) = 12 + 16 + 25$$

$$(x - 4)^2 + (y + 5)^2 = 53$$

This is of the form $(x - h)^2 + (y - k)^2 = r^2$.

Hence,

$$\text{centre} = (4, -5)$$

$$\text{radius} = \sqrt{53}$$

Q9. $2x^2 + 2y^2 - x = 0$

Divide by 2.

$$x^2 + y^2 - \frac{x}{2} = 0$$

$$x^2 - \frac{x}{2} + y^2 = 0$$

$$\left(x^2 - \frac{x}{2} + \frac{1}{16}\right) + y^2 = \frac{1}{16}$$

$$\left(x - \frac{1}{4}\right)^2 + y^2 = \frac{1}{16}$$

This is of the form $(x - h)^2 + (y - k)^2 = r^2$.

Hence,

$$\text{centre} = \left(\frac{1}{4}, 0\right)$$

$$\text{radius} = \frac{1}{4}$$

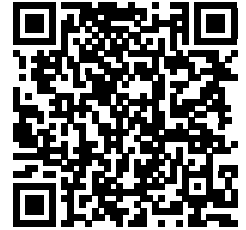


FREE PREVIEW

[Click here to visit our website](#)

SCHOOL NOTES & NCERT SOLUTIONS

Complete notes and
NCERT solutions are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app

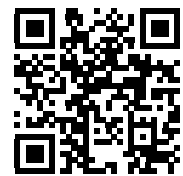


Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHope_CBSE_Notes

Instagram

@firsthope.school

[Click here to follow >](#)

YouTube channel

@firsthope.school

[Click here to watch >](#)

FirstHope website

firsthope.co.in

[Click here to visit our website >](#)

CBSE / Class 9 / Class 10 / Class 11 / Class 12

Preview notes and NCERT solutions. Full PDFs in the FirstHope app.