

# Circles

## 1 11<sup>th</sup> Maths - Exercise 11.1.8

1. Find the centre and radius of the given circle  $\mathbf{x}^2 + \mathbf{y}^2 - 8\mathbf{x} + 10\mathbf{y} - 12 = 0$

## 2 Solution

The general equation of the circle is

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} + f = 0 \quad (1)$$

by using above equation

$$\mathbf{x}^2 + \mathbf{y}^2 - 8\mathbf{x} + 10\mathbf{y} - 12 = 0 \quad (2)$$

$$\|\mathbf{x}\|^2 + 2 \begin{pmatrix} -4 & 5 \end{pmatrix} \mathbf{x} - 12 = 0 \quad (3)$$

Where,

$$\mathbf{u} = -\mathbf{c} \text{ and } f = \|\mathbf{u}\|^2 - r^2 \quad (4)$$

$$\mathbf{u} = \begin{pmatrix} -4 \\ 5 \end{pmatrix} \quad (5)$$

$$f = -12 \quad (6)$$

$$\mathbf{c} = \begin{pmatrix} 4 \\ -5 \end{pmatrix} \quad (7)$$

$$r^2 = \|\mathbf{u}\|^2 - f \quad (8)$$

$$r^2 = 53 \quad (9)$$

$$r = \sqrt{53} \quad (10)$$

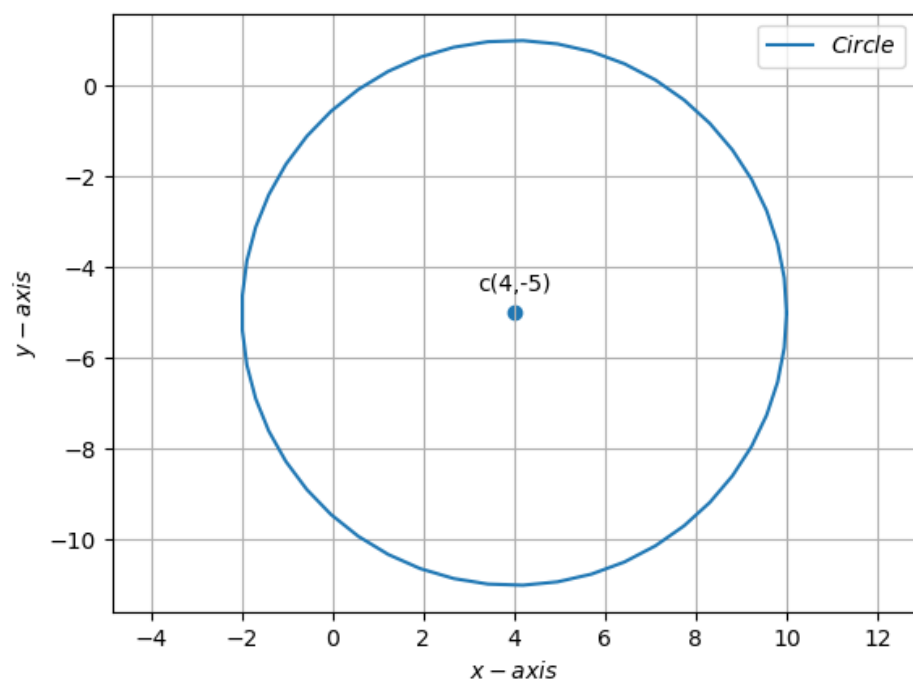


Figure 1