11.11.1.13

Question : Find the equation of the circle with radius 5 whose centre lies on x-axis and passes through the point $(2, 3)$.

Solution :

Input parameters	**Description**	**Value**
r	Radius	5
$\mathbf{O}$	Center	$x\mathbf{e_1}$
$\mathbf{A}$	Point	$\begin{pmatrix}2\\3\end{pmatrix}$

Table 1: Table of input parameters

The general formula of the circle is

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

$$where, \mathbf{u} = -x\mathbf{e_1} \tag{2}$$

$$OA = r \tag{3}$$

$$\sqrt{(2-x)^2 + 9} = 5 \tag{4}$$

$$x = 6 \tag{5}$$

$$or, x = -2 \tag{6}$$

For $x = 6$

$$||\mathbf{A}||^2 + 2\mathbf{u}^\top\mathbf{A} + f = 0 \tag{7}$$

$$or, f = 11 \tag{8}$$

For $x = -2$

$$||\mathbf{A}||^2 + 2\mathbf{u}^\top\mathbf{A} + f = 0 \tag{9}$$

$$or, f = -21 \tag{10}$$

Therefore the equations of the circle are

$$||\mathbf{x}||^2 - 2\begin{pmatrix}6 & 0\end{pmatrix}\mathbf{x} + 11 = 0 \tag{11}$$

$$||\mathbf{x}||^2 - 2\begin{pmatrix}-2 & 0\end{pmatrix}\mathbf{x} - 21 = 0 \tag{12}$$

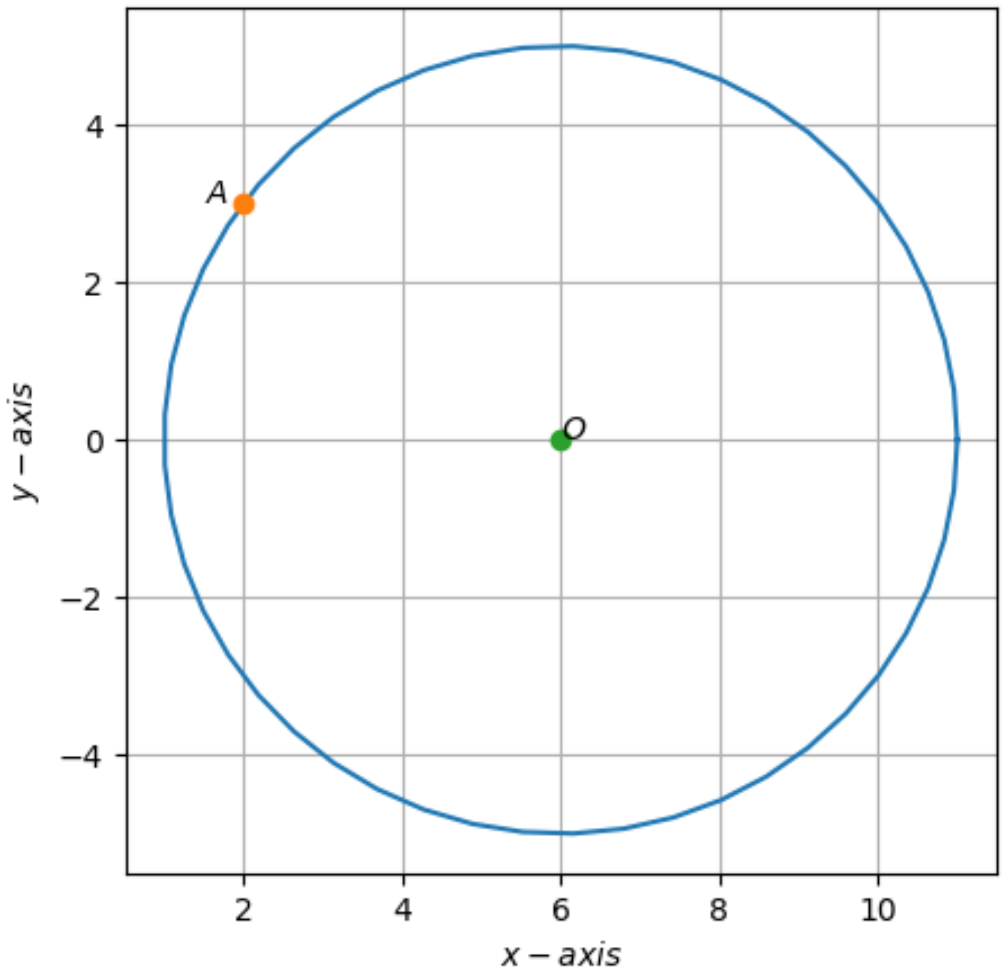

Figure 1:

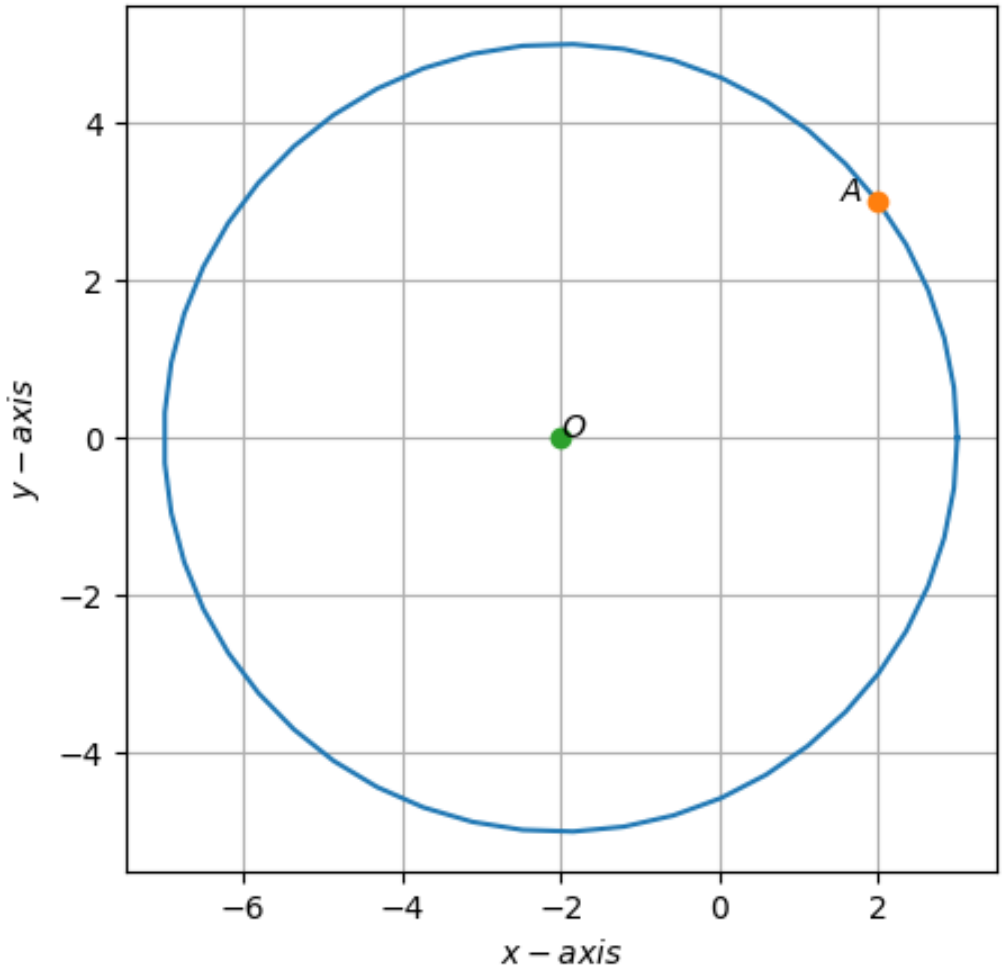

Figure 2: