

# THE CARTESIAN PLANE

## ***Learning outcomes***

At the end of this chapter, Learners will:

- Draw the  $XOY$  plane
- Plot and read the ordered pair  $(x, y)$  on the  $XOY$  plane
- Join different points on the Cartesian plane
- Graph straight lines

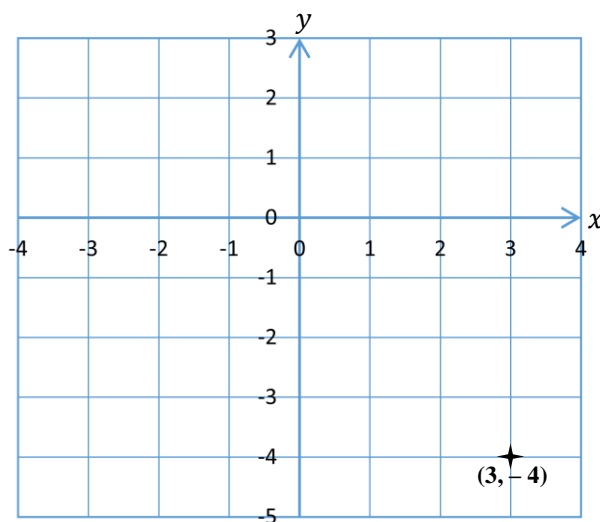
## **CONCISE INFORMATION**

### **The $XOY$ plane**

There are two axes on the Cartesian plane: a horizontal axis and a vertical axis. The intersection of the two axes called the Origin. The horizontal axis is called the  $x$ -axis and has negative numbers on the left on the origin and positive numbers on the right of the origin. The vertical axis is called the  $y$ -axis and has negative numbers below the origin and has positive numbers above the origin.

### **The ordered pair $(x, y)$ on the $XOY$ plane**

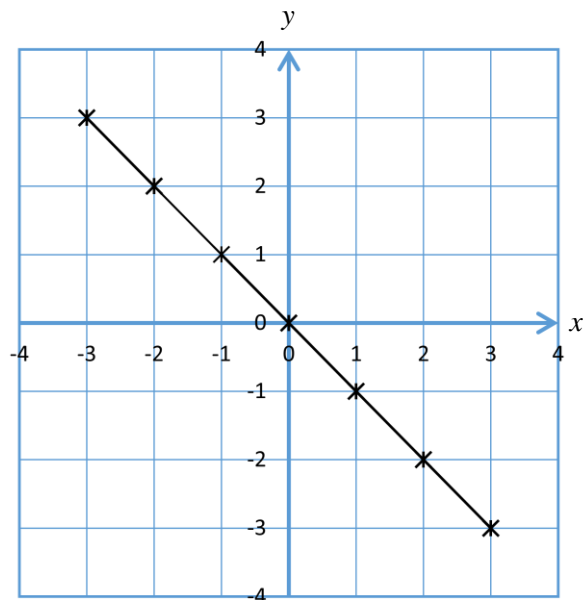
An ordered pair of numbers on the Cartesian plane are called coordinates. The coordinates  $(x, y)$  determine the position of a point on the  $XOY$  plane. The  $x$  is the number of units along the horizontal axis and the  $y$  is the number of units vertically. For example, the coordinates  $(3, -4)$  means moving 3 units along the  $x$  -axis in the positive direction and then 4 units vertically in the negative direction (or downwards).



### **Points on the Cartesian plane**

A point on the Cartesian plane is the intersection of a vertical line and a horizontal line. Points on the Cartesian plane can be joined to form different shapes: straight lines or two dimensional (plane) shapes. The straight obtained on the Cartesian plane can be described by a mathematical expression of an equation.

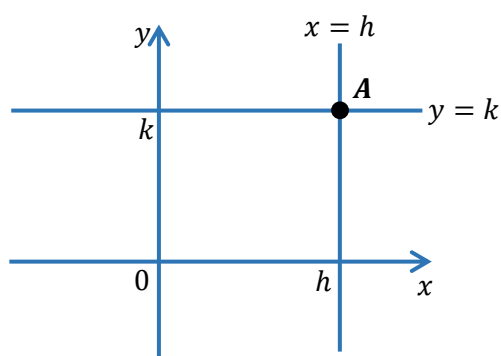
In the diagram below, the relationship between  $x$  and  $y$  values can be described as: the value of  $y$  is equal to the product of  $-1$  multiplied by value of  $x$ . This results in a mathematical equation given by  $y = -x$ .



### Graph of straight lines

The graph of the function  $f(x) = k$  or  $y = k$ , where  $k$  is a real number, is a horizontal line and the graph of the function  $x = h$ , where  $h$  is a real number, is a vertical line.

If the horizontal line is above the  $x$ -axis the value of  $k$  is positive and it is negative if the line is below the  $x$ -axis. If the vertical line is to the right of the  $y$ -axis the value of  $h$  is positive and it is negative if the line is to the left of the  $y$ -axis.



Point  $A$  has coordinates,  
 $A(h, k)$